CHAPTER 8

ENVIRONMENTAL CONSIDERATIONS

This chapter discusses military operations in a variety of environments. They are military operations on urban territory (MOUT), and amphibious, cold weather, and jungle operations. River crossing operations are also discussed.

MILITARY OPERATIONS ON URBAN TERRAIN

The tremendous growth of urban areas worldwide has reduced the amount of open, maneuverable terrain available to attacking or defending forces. Many urban areas have grown together to form giant urban obstacles extending for many kilometers. These areas are generally located on or near traditional movement corridors in regions rich in natural or industrial resources. They play an important role in the economic and political life of many countries. Consequently, there are many areas of the world where attack or defense of a city maybe required.

Division commanders and staffs must understand the problems and complexities of MOUT. Doctrine applicable to the open battlefield is equally applicable to the urban battlefield. The decision-making methodology used to develop and war-game courses of action remains the same. Only the factors of METT-T change. Commanders and staffs must know and understand the unique challenges of the urban battlefield. The urban battlefield is characterized by isolation. Because of this isolation, the urban battle requires psychologically strong leaders with positive attitudes. However, the MOUT battle is the type of fighting at which properly supported infantry units excel. FMs 90-10 and 90-10-1, the current doctrinal references for MOUT, are written for battalion and lower levels. This section provides division-level commanders and staffs a summary of MOUT tactics, techniques, and procedures.

Role of the Infantry Division

The division can expect to conduct both offensive and defensive operations in urban areas. With proper training, equipment, force protection, and leadership, the infantry division can effectively defend against armored forces. In conjunction with armored forces, the division can also conduct offensive operations against a combination of armored and light forces. The division may defend urban areas to—

- Control avenues of approach.
- Act as a combat multiplier by freeing more mobile armored forces to act as a reserve force as part of a corps or Army plan.
- Retain key transportation or economic centers.
- Protect or hide the force.
- Deny strategic or political objectives to the enemy.

As commanders and staffs conduct the mission analysis for MOUT, they must consider—

Ž Different IPB requirements.

- Special C^2 requirements.

Ž Unique task organization requirements.

Ž Fire support capabilities and limitations.

- Weapons effectiveness.

Ž Special considerations for health service and logistics support.

- Special equipment for urban operations.
- Control measures.

A discussion of each of these considerations follows.

Intelligence Preparation of the Battlefield

The IPB process for the urban battlefield follows standard doctrinal methodology. However, the nature of urban warfare requires additional information not normally generated in the IPB process. This includes—

Ž Information on underground passages, such as sewers, subways, heating tunnels, and water and

electrical conduits which might be used by enemy or friendly forces for intracity movement.

•Information on water supplies and electrical power generation and distribution systems.

ŽCity maps and aerial photographs denoting building heights, overhead obstacles, bridges (and their locations and capacities), hospitals, and other special purpose buildings.

•A detailed building and bridge analysis, and information on building survivability and structural integrity.

•Grid or area shutoffs for power, water, gas, and other utilities,

•Information on factories and other types of industry which might impact operations, including refineries, rail yards, heavy equipment suppliers, industrial complexes, and medical facilities. (The G2 must conduct a careful analysis to determine if use of these facilities will assist or hinder operations.)

•Information on communications systems which might aid C^2 or the control of which might deny a hostile populace or enemy the ability to rapidly disseminate information. (These include telephone systems, radio and television transmitters, and microwave and satellite relay facilities.)

•Information on local civil authorities, political leaders, and the population. Planning for refugee problems and evacuation is critical to both offensive and defensive operations. A detailed civil affairs action plan is essential.

Command and Control

Urban combat is one of the most difficult missions infantry forces may be given. Terrain isolation is its dominant characteristic. Centralized planning and decentralized execution of MOUT is critical. Command and control of urban operations is exacerbated by terrain isolation and difficulties in communicating by tactical radio. Planning for C^2 must include the use of all communications systems. This includes existing telecommunications systems and TACSAT radios to link division, brigades, and battalions; FM radios; and tactical wire. The use of other devices, such as RPVs, sensor strings, or remote video links, may provide the commander real-time intelligence and can also be used to call for and adjust fires.

Task Organization for Combat

In developing effective task organizations for MOUT, commanders and staffs must recognize the unique challenges of urban warfare. Conventional task organizations may not be effective. For example, due to difficulties encountered in population and refugee control within an occupied city, additional CA support may be required. These assets may have to be provided down to brigade or lower levels. A defending division, augmented with armored forces, may opt to use them as a mobile counterattack force within a city or as part of a blocking force on a major avenue of approach. They may also be assigned a mission outside of the city to interdict the attacker's LOCs. Combat support assets, such as engineers and MI assets, may also receive nonstandard missions.

Fire Support Capabilities and Limitation

Urban terrain increases the difficulty of FS planning and execution. Man-made structures can be obstacles to effective artillery fire support, masking effective fire (even when high-angle fire is used). Positioning of DS artillery may be limited to large parks and athletic fields and may require positioning outside of a city to provide massed fires inside or on avenues of approach to the front. Batteries may have to be in nonstandard firing configurations to fit urban terrain. They may also have to operate in a direct fire mode in the offense to reduce enemy strongpoints. Subordinate maneuver units may have to rely on organic mortars for much of their indirect fire support. In both the defense and offense, the division should use a standard building marking system to assist in calling for and adjusting fire support by aircraft. In the defense, this system may actually include marking building tops. Building locations should be pinpointed using GPS to facilitate precision fire support. Additionally, there may be more RFAs, such as areas near hospitals, churches, and shrines. Information on these areas must be disseminated to the lowest levels.

Weapon Systems Effectiveness

Leaders must give special consideration at brigade and battalion level to the positioning and

use of organic weapon systems. The restrictive nature of city streets may make it impossible to position TOW and Dragon antitank systems so as to achieve the 65-meter minimum arming distance and still place effective fire on enemy armored vehicles. When fired at defensive positions in buildings, the warhead in these and other antitank missiles makes them less effective than 105-millimeter howitzers or 90-millimeter recoilless rifles (available from supporting engineer units). Time and proximity fuzes enhance the effectiveness of artillery fired at the enemy on rooftops and behind barricades. If 155-millimeter or 8-inch self-propelled howitzers are available to the division in the offense, they are effective direct-fire weapons, particularly against bunkers and entry points.

Tanks and BFVs can be extremely effective in the city in supporting both offensive and defensive operations. Tank main guns generally do not make good entry-point holes in buildings, but can prove effective when fired at point targets. High-explosive ammunition should be used in most cases. Tanks can destroy steeples, tall chimneys, and other structures containing enemy artillery observers. The tank's greatest value may be its mobile machine gun support to maneuvering infantry, With two 7.62-millimeter and one .50 caliber machine guns, two tanks have the mobile machine gun firepower of an infantry company.

The division can use attack helicopters at night to detect and eliminate the enemy in strongpoints. If terrain permits, they can also provide precise fire support. Like armored forces, attack helicopters can play a decisive role in interdicting attacking enemy forces and their LOCs.

When the division defends strongpoints, antitank mines will be more difficullt to emplace and conceal in urban areas; consequently, their effectiveness will be degraded. The use of antipersonnel mines inside buildings may be more effective. More information on weapons effectiveness is found in FMs 90-10 and 90-10-1.

Health Service and Logistics Support

The number of casualties will be high in the city battle and the difficulty of evacuation greater. Aerial evacuation will be extremely difficult and even impossible in some areas. To deal with these challenges, trauma treatment centers, with doctors, may need to be positioned well forward in the offense, or established throughout the city in the defense. Medical care and evacuation are critical to maintain the morale and confidence of soldiers. Combat lifesavers will need to be supplemented with additional medical supplies because casualties will be higher and evacuation times likely increased. Medical evacuation routes and casualty collection points may be more difficult to coordinate due to obstacle belts and battle-induced rubble.

Logistics support is greatly affected by the city battle. Logistics must support changes in demand which occur during the attack or defense of a city. The division will experience major increases in demand for small arms, grenades, 40-millimeter projectiles, mines, mortar ammunition, light antitank weapons, and demolition equipment. Due to changes in consumption rates, units may not properly forecast their ammunition requirements. As a result, resupply must be pushed, not pulled. Where possible, supplies and ammunition must be stockpiled in the defense, Conversely, the division must make every effort to interdict an attacker's LOC to slow and defeat his attack. This may require positioning small units outside a city prior to an attack. Large numbers of displaced persons can also adversely affect the division supply system.

Special Equipment Requirement

A division fighting in a city may need special equipment. At battalion level, this may be shotguns, body armor, additional sniper weapons, and more concussion, smoke, and fragmentary grenades. A description of special equipment can be found in FMs 90-10 and 90-10-1. At the division level, additional communications assets may be required. Infantry divisions do not have sufficient wire and telephones to effectively "wire-in" a city defense. Since such assets may not be available, the division may require additional TACSAT radios to improve communications.

Control Measures

Combat in urban areas requires the same control measures as operations in other terrain. However, in the urban fight, some control measures

will be easier to identify while others may be more difficult. These include—

- Frontages and zones of action.
- Boundaries.
- Checkpoints and contact points.
- Phase lines.
- Objectives.

Frontages and Zones of Action. In the offense, brigades are normally assigned relatively narrow zones of action, based on enemy strength, size of buildings, and level of expected resistance. An attacking brigade task force could be assigned a frontage of from 6 to 12 city blocks. Frontages and zones of action influence formations. However, in the urban battle, commanders should maintain a significant reserve well forward. The reserve can add momentum to the attack, exploit success, repel counterattacks, and protect flanks and the rear from enemy action.

Boundaries. Boundaries should be easily identifiable. No strict rules apply to boundaries, except one unit should control approaches. In dense urban areas, boundaries may be placed on one side of a street to give a defending unit responsibility while buildings on the opposite side are occupied by another unit. Boundaries may also be placed to allow one unit to include both sides of a street. Boundaries should never divide a major avenue of approach. Assignment of boundaries must be the result of careful terrain analysis.

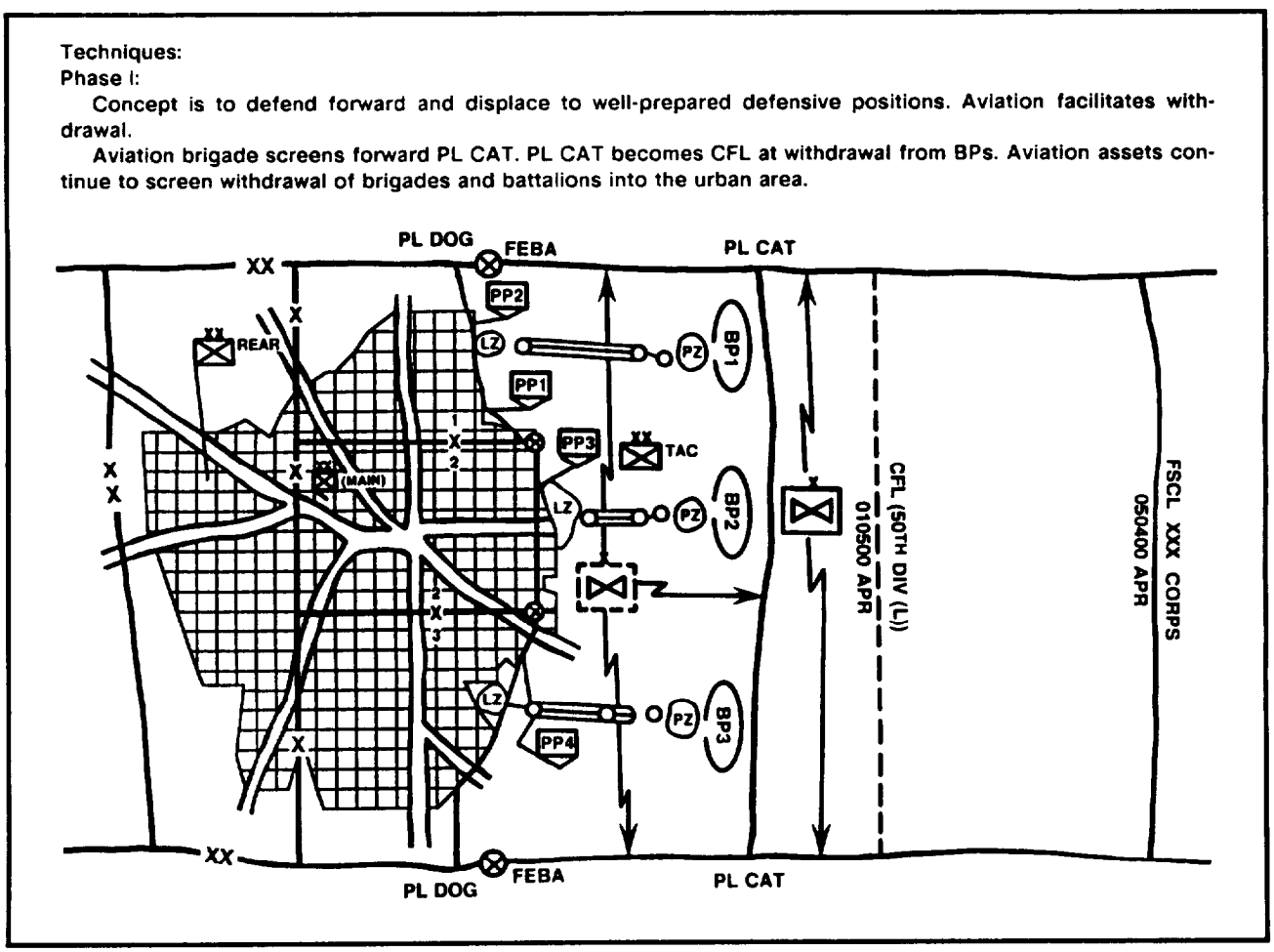

Figure 8-1. Example defensive MOUT operation: phase I

Checkpoint and Contact Points. Street corners, buildings, railway crossings, bridges, and other easily identifiable features can be assigned as checkpoints or contact points. As in any operation, these are critical, specific points where the commander desires units to make physical contact.

Phase Lines. Phase lines increase control in both the offense and defense. In the offense, they assist in regulating the advance of attacking forces and synchronizing the battle. In the defense, they assist in reporting enemy penetrations and may be used to trigger command decisions. Streets, rivers, and trolley and railroad lines make easily recognizable phase lines.

Objectives. In the urban fight, objectives can take on several characteristics. They can be terrain, such as a principal building, or a specific area, such as a petroleum tank farm. They can also be several buildings located around a major intersection. If the commander's intent is to clear in zone up to a specific point, a limit of advance may be more appropriate than an objective.

Defensive Operations

Built-up areas present obstacles to an attacking force while providing the defender an advantage and some protection. A small, well-prepared force in an urban defense can defeat or hold off a much larger attacking force. Strongly constructed cities give the defender a decided advantage. Each building or group of buildings is a potential strongpoint. With additional construction and the use of barricades, mines, and booby traps, an urban area can become a veritable fortress. Under some conditions, elements of the division may hold built-up areas while the remainder of the division defends from adjacent restrictive terrain.

The following are techniques and guidelines for defensive MOUT operations:

Ž *Establish* defenses in depth in built-up areas. The defense must start far forward and include approaches to the urban area.

• *Integrate* adjacent terrain into the defense.

ŽUse security forces operating in depth to counter enemy ground reconnaissance and infiltration.

• *Use* restrictive missions and detailed control measures to facilitate decentralized execution.

• *Employ* the combined arms team to maximize individual unit capabilities.

• *Maintain* a strong, mobile reserve to counterattack and block penetrations.

Figures 8-1 and 8-2 are examples of defensive MOUT operations.

Offensive Operations

A detailed study of an urban area and enemy dispositions in and around it forms the basis for planning the attack. As in any attack, planning must provide for both maneuver and fire support. Attacking forces may be an infantry-heavy assault force and a tank-heavy enveloping force, Coordinated fires support both forces. The enveloping force—

• Prevents the enemy's escape.

• Prevents reinforcements from entering the city.

Ž Provides direct FS for the direct assault force.

• Protects the assault force from counterattack.

The assault force clears the city of enemy resistance and links up with the enveloping force. The attacker has the advantage of maneuver to isolate an urban area. Then, he can either press the attack or contain the defender and perhaps force him to capitulate without a direct attack. The attacker selects his best point of entry and can attack from any direction. He can choose to bypass strongly defended buildings and contain or isolate the defenders.

The following are proven techniques and guidelines for conducting offensive MOUT operations:

• *Attack* a built-up area only as the last resort, and only when major advantage accrues through its seizure or control.

• *Know* the characteristics of urbanized terrain and advantages and disadvantages it offers to either attacker or defender.

Ž *Attack* where the enemy is weak—hit his flanks and rear simultaneously.

ŽRequire detailed planning by subordinate commanders to enhance decentralized execution and minimize C2 problems during an attack.

Phase II:

Phase II is an enlargement of the urban area.

Division assigns alphanumeric designations to each block. Brigade is responsible for numbering all buildings, dwellings, houses and structures. No fire areas (NFAs), hospitals and cultural and religious areas, are preserved.

Once inside the urban area, far sides of blocks (enemy side of the street) are the CFL during withdrawal. Brigade develops CFL, division consolidates.

Boundary shift for 1st brigade is behind PL BIRD to brigade rear boundary.

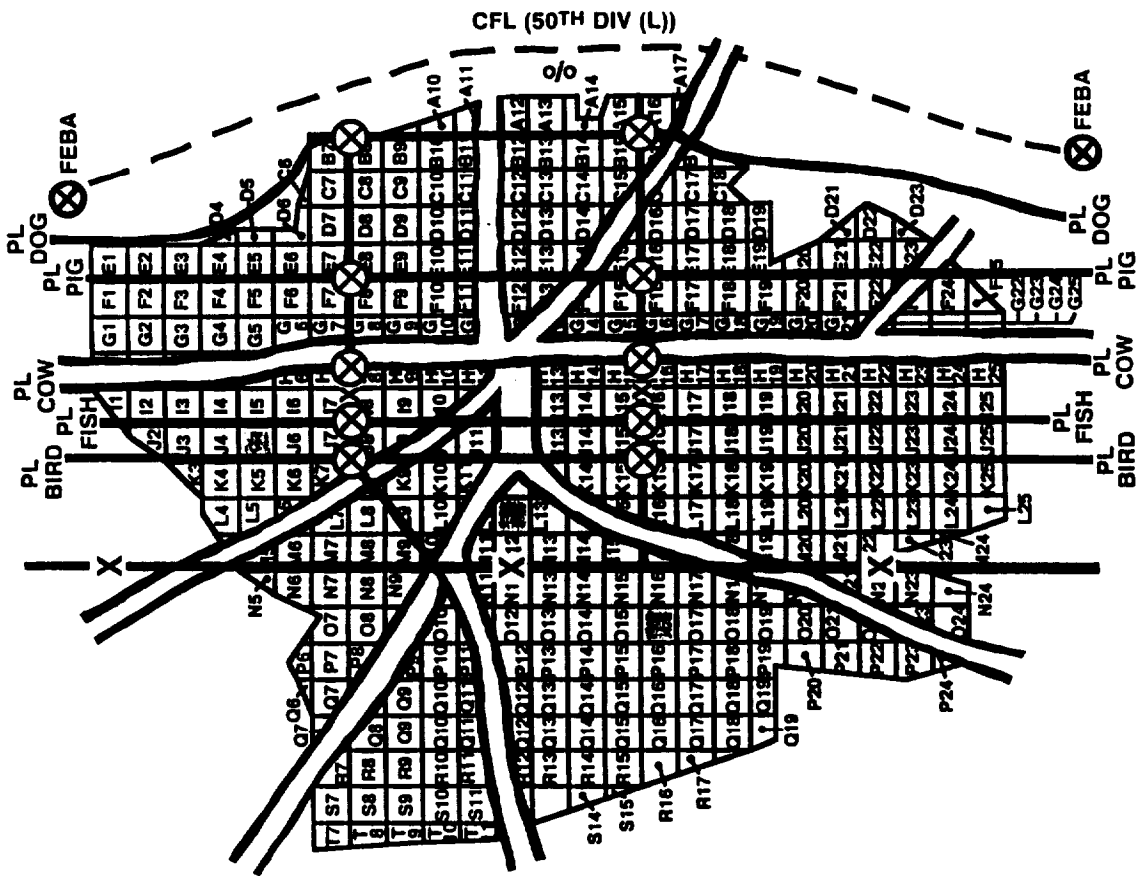

Figure 8-2. Example defensive MOUT operation: phase II

• *Employ* combined arms team to maximize capabilities and minimize vulnerabilities.

• *Dissipate* an enemy's strength by causing him to react to demonstrations, feints, or ruses.

• *Maneuver over* approaches to a built-up area with smoke protection and overmatching fires.

Ž *Reduce* strongpoints with fires where possible, then keep moving, and secure them with follow-on forces.

Ž *Cut* lines of communications and defeat the enemy through isolation.

Ž *Attack* at night to gain surprise and maximize the night technology advantage of US forces.

Ž *Keep* the attack continuous until defenses have been splintered once momentum has been gained.

Figures 8-3, 8-4, and 8-5 are examples of offensive MOUT operations.

Techniques:

Division assigns alphanumeric designations to each block. Brigade numbers each dwelling or structure and submits to division. Brigade develops CFL; division consolidates all CFLs.

Phase I: Isolate

Commander's intent is to rapidly bypass the town. Success is preventing escape, withdrawal, or reinforcement.

Designation of objectives is to facilitate reorientation for phases II and III.

PL used as CFL, adjusted through execution matrix as maneuver units approach.

Aviation brigade –

- prevents enemy reinforcement.
- prevents escapes, withdrawal (critical to future corps operations).
- covers movement into DOG and CAT.

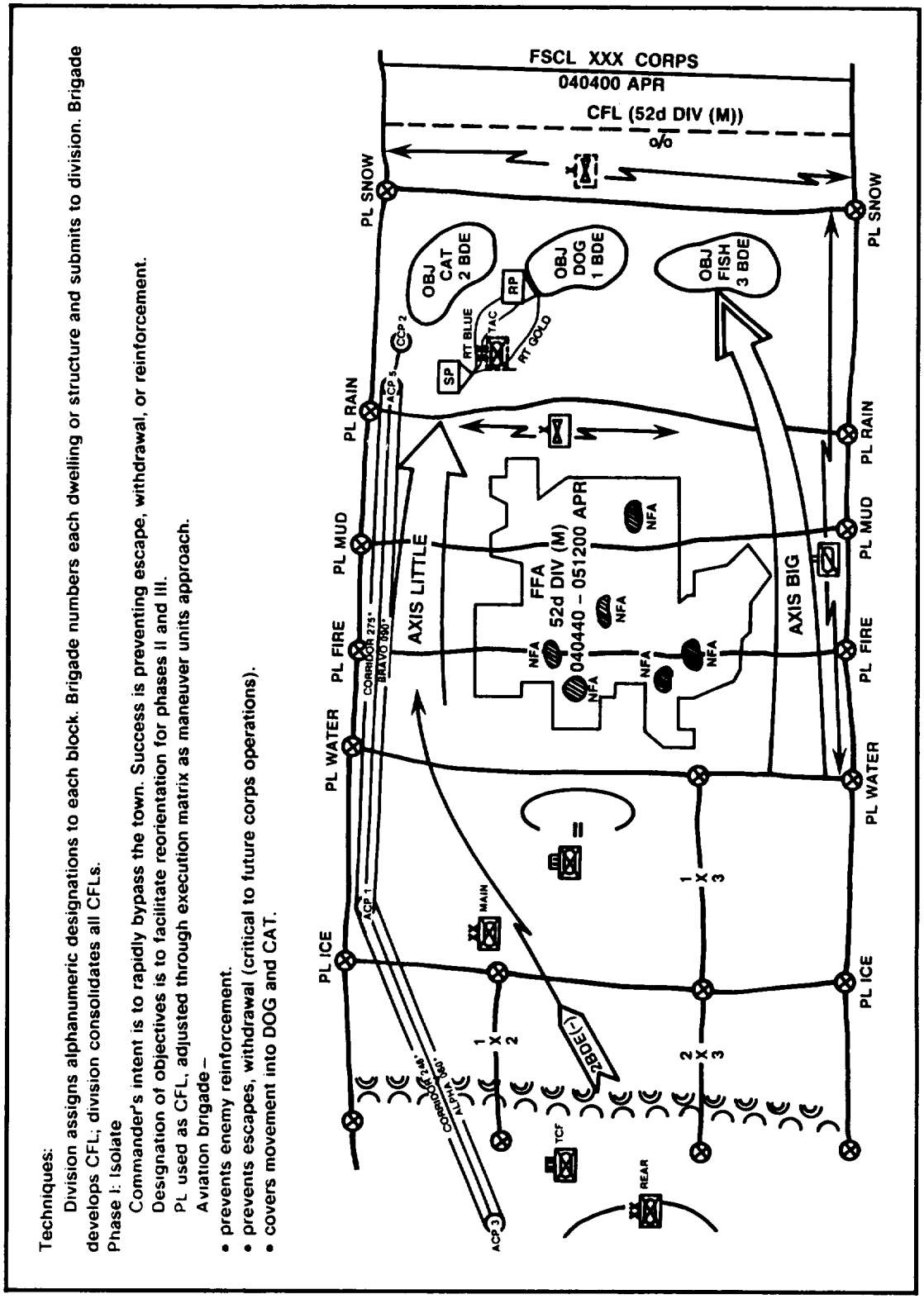

Figure 8-3. Example offensive MOUT operation: phase I

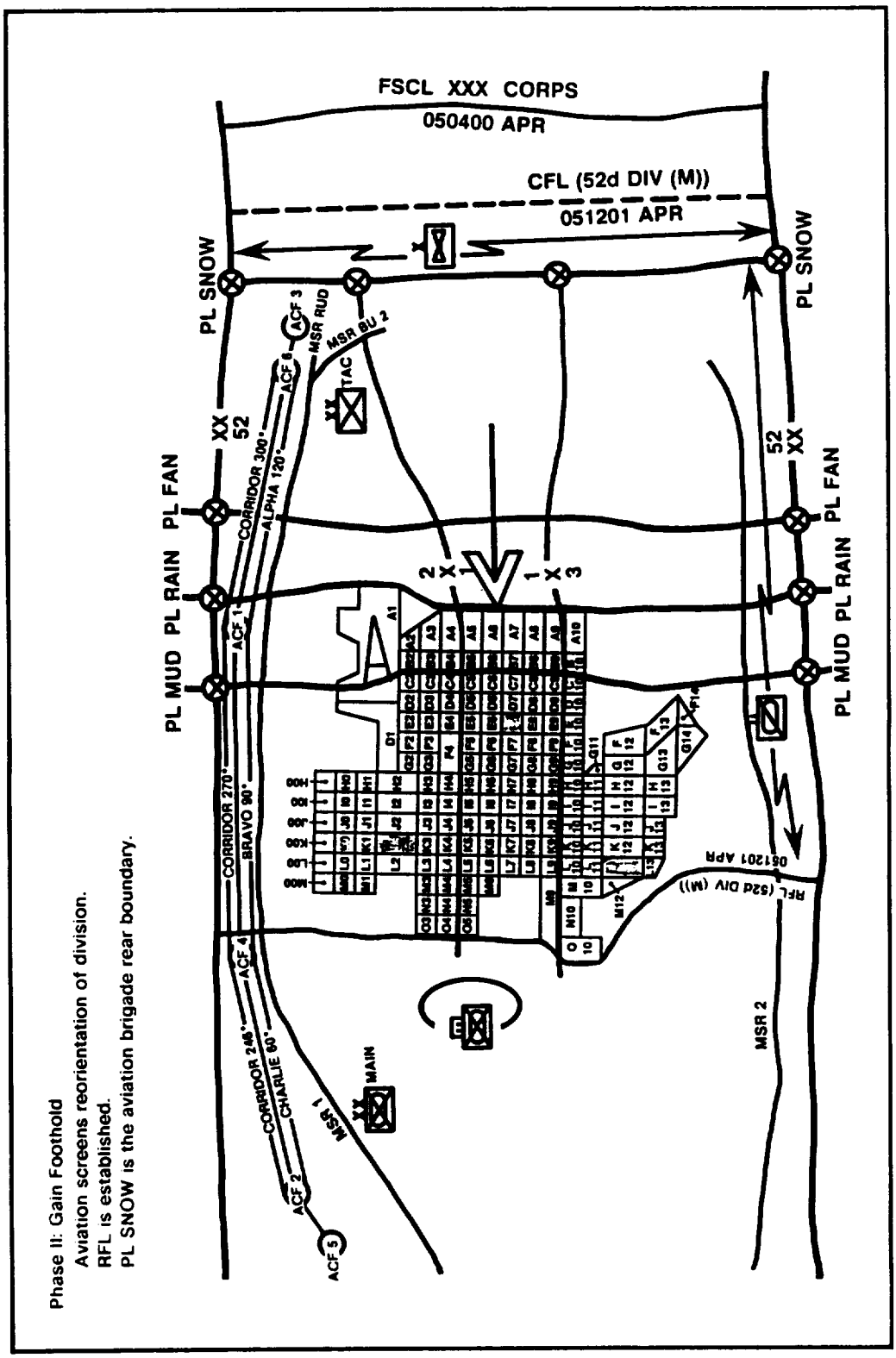

Figure 8-4. Example offensive MOUT operation: phase II

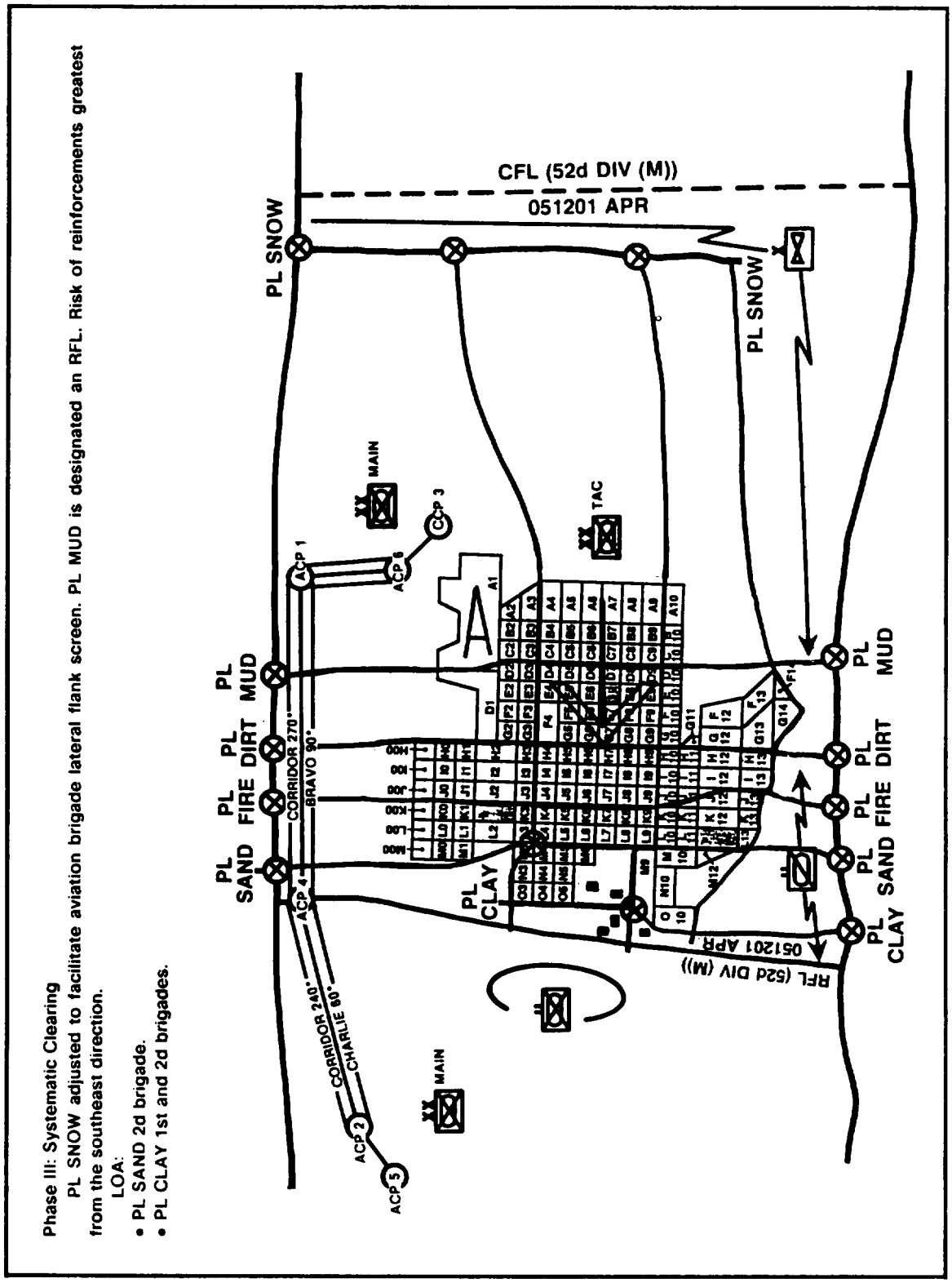

Figure 8-5. Example MOUT operation: phase III

Attacks in MOUT normally have three phases. *Phase I* is isolation of the city and seizure of terrain features dominating approaches. The division secures positions outside the built-up area from which to support entrance into the city itself. The tactics and techniques for this phase of the operation are similar to those of attacks against other well-organized enemy positions.

In *phase II,* the division advances to the edge of the built-up area and gains a foothold, while eliminating the defender's observation and direct fires on approaches into the area. From the foothold area, the attacking unit penetrates on a narrow front with tanks and infantry leading where possible. Supporting fires on the entry point focus on this frontage and on preventing attacks from the flanks. Assaulting forces can expect to encounter barricades, antitank obstacles, mines, boobytraps, and antitank fire. The probability of success increases if the assault is launched from an unexpected direction during periods of limited visibility, or under cover of smoke.

Phase III varies from a systematic, block-by-block, house-to-house reduction of the built-up area to a rapid advance with clearance of only critical areas and buildings. Phase III begins without pause after the completion of phase II. Clearance and seizure techniques depend on METT-T.

When the built-up area is large and heavily fortified, and the mission requires a methodical house-by-house, block-by-block clearance operation, the division should divide the area into brigade zones of responsibility. Each subordinate unit must clear its zone completely, leaving no enemy to its rear.

There may be occasions, such as the US intervention in Panama in 1989, where light forces deploy in support of national objectives to eliminate a hostile military or oppressive paramilitary force. Under such circumstances, a large percentage of the population may actually be sympathetic to the policy and objectives of the United States. Restrictive ROE normally characterize this type of action, which may be part of a NEO. In such cases, a graduated response may be warranted. This may include a demonstration using the precision fires of AC-130s, AH-64s, or field artillery in proximity to, but not actually on, hostile forces in an attempt to convince them to capitulate.

Operation JUST CAUSE provides several excellent examples in which a graduated response resulted in the surrender of enemy forces. In one instance, US Army Rangers used the precision fire of an AC-1 30 to convince a Panamanian garrison to surrender. The garrison commander was directed to call other Panamanian units and report what he had seen. The result was the surrender of several other units without a direct confrontation. In addition to preserving life on both sides, a graduated response may also assist in building or retaining the sympathy of a local population by limiting physical damage and loss of life. A graduated response maximizes economy of force.

AMPHIBIOUS OPERATIONS

Infantry divisions participate in amphibious operations as part of the Army component of a joint amphibious task force. Joint Publication 3.02 series and FM 31-12 set forth the fundamental principles, doctrine, and procedures for the Army component of a joint amphibious task force, including preparatory training.

An amphibious operation is an attack on a hostile shore launched from the sea by naval and landing forces. It includes the following phases-planning, embarkation, rehearsal, movement, and assault.

The Army landing force is the Army component of the joint task force. The composition and size of the Army component varies with the type of amphibious operation, the force's mission, and the environment. The Army landing force is made up of basic tactical organizations. They vary in size from the lowest echelon capable of semi-independent operations to a field army. The force may include elements of a division, a complete division, or several divisions of the same or different types. Assault divisions are those divisions of the landing force that execute assault landings.

Armored, infantry, light infantry, or mechanized divisions are normally surface assault divisions. However, infantry divisions are best suited for use as surface assault divisions because of their suitability for movement in transport ships and ship-to-shore assault craft and aircraft. They

also require less logistics support initially. The large numbers of heavy vehicles in mechanized and armored divisions require more landing ships for movement and landing. They have a continuing requirement for large amounts of logistics support.

Mechanized and armored divisions are well suited for landing over secured beaches. They can advance rapidly inland in exploitation or pursuit. Airborne and air assault divisions are not normally surface assault forces in amphibious operations due to their unique, long-range deployment capabilities. In amphibious operations, C3 is vital. All components of the force prepare and coordinate detailed plans.

Amphibious Task Force Objective, Area, and Mission

The amphibious objective area is the AOR the establishing authority assigns to the amphibious task force commander. It includes land, sea, and air space for operations.

The division's mission usually includes an area or areas it must seize within the objective area. The commander and component commanders select general courses of action for those objectives.

The mission for the Army component is to accomplish the larger task force mission. However, when the purpose is invasion or tactical maneuver, the mission must also include preparations for the land campaign after the amphibious operation places the force on the hostile shore. Commanders must consider the need for the rapid landing of follow-up units to exploit beyond the beachhead.

Basic Considerations for Operations Ashore

The Army landing force commander translates the assigned mission of the Army force into specific objectives ashore. The objectives influence the size and composition of the force and the scheme of maneuver. The scheme of maneuver, fire support, and phasing of the operation make up the landing force commander's concept of operations. Before deciding on a scheme of maneuver, he must consider conditions in the amphibious attack and their effect on force organization.

Development of Combat Power Ashore

The landing force develops combat power progressively. The force can exert only a small fraction of its total combat power initially. Small units fighting independently, supported by naval guns, missiles, and tactical aircraft, initiate the attack. Land combat power gradually increases until the entire landing force is ashore, functioning as a cohesive organization and exerting its maximum combat power. The echelonment of the landing plan should provide for the orderly development of combat power.

Rapid and aggressive action maintains the momentum of the assault. Commanders must reduce delays to the absolute minimum. Using dispersed forces in amphibious operations aggravates problems in achieving mass, C3, and combat and administrative support.

Echelonment for Landing

The rate of landing and development of combat power ashore depends on several factors. The most important are—

- Availability of shipping and landing craft, amphibious vehicles, and helicopters as ship-to-shore movement means.
- Capacity of the landing beaches and zones.
- Degree of enemy resistance to the landing.
- Extent of fire support provided the landing force.
- Terrain, weather, and sea conditions in the landing area.
- Need for balance among combat, CS, and administrative support units.
- Area available ashore for maneuver and dispersal.

These factors influence the rate of landing and, thus, the composition of the assault echelon. The number and types of available amphibious assault ships and means for ship-to-shore movement may also limit the materiel the force can land initially. The commander must include only

essential personnel, equipment, and supplies in the assault echelon.

He must also organize his force to reinforce assault units for self-sufficiency. Division planners should schedule units and supplies and equipment not needed early in the assault for later arrival in the objective area.

Forces executing landing and initial onshore operations are structured according to the commander's concept for the attack. This concept, the nature and extent of enemy defenses, and the terrain determine troops and fires to use in the assault, in support, and in reserve.

Normal control and support from the next higher echelon is initially absent. Each command echelon should be capable of independent operations until the next higher echelon is ashore and can assume responsibility for control and support. In the interest of speed, mobility, flexibility, and economy of force, attachments should be those essential to independent operations.

To support the concept of operation, the organization for landing must provide—

Ž Maximum shock effect at the point of landing and cumulative shock effect in the direction of the objectives.

Ž Depth to the assault for flexibility and a sustained buildup of combat power as the attack develops.

Ž Dispersion consistent with other requirements.

Ž Flexibility sufficient to exploit weaknesses in enemy defenses.

Ž Timely establishment and use of both tactical and administrative support systems ashore.

Ž Tactical integrity of subordinate organizations.

Reinforcement requires attaching units to subordinate organizations to achieve unity of command. Attachments are for a specified or unspecified time, until a certain event has taken place, or for the duration of the landing. A unit is under the control of the organization to which it is attached during landing. Thereafter, it reverts to the control of its parent or other organization. The headquarters making attachments for the landing designates the approximate landing time (or sequence). The organization to which a unit is attached schedules the unit ashore. The landing force commander makes attachments for a landing when a unit must land early to prepare for subsequent operations. He may also do this if he does not want to delegate command authority to subordinate commanders. Examples of attachment to an assault division are a battery from the corps artillery brigade, or elements of a construction unit which must make early reconnaissance.

The organization for movement and landing of the force has three echelons:

• The *advance force echelon* includes elements of the landing force included in the amphibious task force advance force.

• The *assault echelon* is made up of the assault elements and reinforcing elements. The latter land on a nonscheduled basis on beaches or in landing zones already secured by landing teams. Assault shipping transports the assault echelon.

Ž The *follow-up echelon* consists of elements not required in the assault echelon. Assault shipping or follow-up shipping (or both) transport the follow-up echelon.

Phasing of the Attack

The commander must consider the rate of landing of tactical and support forces to phase a land offensive. Phasing which calls for exploitation out of the beachhead must be realistic. The commander must phase the assault in his concept of operations. Subordinate leaders then designate objectives and phase lines to implement the concept.

Decentralized execution characterizes the initial phase of an amphibious assault. The commander should not reduce the speed of his rapid and decentralized attacks by attempting to reestablish centralized control too quickly. On the other hand, he should not expose his forces to the danger of defeat by hesitating to reestablish this control when it is necessary.

Fire Support

A major difference between land and amphibious operations is the landing force's initial dependence on nonorganic fire support. Until FS lands on shore and is ready to carry out its

mission, the force depends on naval, missile, and aircraft fires. When organic FS is established ashore, aircraft, missiles, and naval fires revert to their normal support roles.

The dependence on nonorganic FS influences the selection of initial objectives and maneuver. Naval guns, missiles, and aircraft are ideally suited to support dispersed tactical formations. The commander can use them anywhere (within limitations imposed by the sea, weather, and the maximum range of naval guns).

Reserve

The reserve in an amphibious attack may consist of fires, maneuver elements, or a combination of both. The commander will usually withhold a portion of the initial assault force to provide security to the landing force and flexibility to the assault. This portion of the force lands when and where the commander desires to best influence the tactical situation as it develops ashore. It is, in effect, a landing force reserve.

Within the division, use of the reserve maybe limited during the initial assault. Then, all assault teams deploy to achieve maximum shock effect. The division commander can influence the action ashore with reinforcing elements which land on a nonscheduled basis. While afloat, reinforcing units are also a reserve force.

Commitment of the reserve is more complex than in normal land operations. While the reserve is afloat, the nonavailability of landing craft, amphibious vehicles, or helicopters, and the time required for debarkation and movement ashore, delay its commitment. Therefore, commitment of these forces must be anticipated far enough in advance to compensate for this time.

If the reserve is afloat in landing craft or amphibious vehicles, or on a ship with helicopters standing by, the ship-to-shore movement of other elements of the landing force may be delayed for lack of suitable landing means. Landing of the reserve by surface means requires availability of a suitable landing beach.

Because of the decentralized nature of initial operations ashore, it may be difficult to coordinate the landing of the reserve with operations ashore. When there is no longer any advantage in keeping the reserve afloat, it should land and take positions ashore. The commander should not order this until the assault force has seized sufficient area ashore to permit dispersion of the force.

Because the outcome of operations ashore may be unclear, the commander should maintain maximum flexibility of his reserve force until a specific need for its commitment arises. The reserve should be able to take over the assault mission of committed units and should have plans for this contingency. It should have adequate attachments including a shore party. Plans should provide a means for landing the reserve in an assault role.

The commander may favor retaining a higher-echelon reserve in base areas; he can transport it to the objective area in aircraft if there is a shortage of assault shipping or congestion in the objective area. The commander should plan to use fires held in reserve for contingencies, to support forces ashore, and to aid exploitation.

Beachheads and Corresponding Landing Areas

The process of choosing beachheads and landing areas begins with considering potential sites. The selection of beachheads and landing areas, and the concept of operations ashore are closely interrelated. The commander and staff must consider them concurrently.

A beachhead is an area extending inland from the water's edge which, when secured, will permit continuous landing of troops and materiel and provide maneuver space for further operations ashore. The landing force commander determines which beachheads are suitable for operations.

Each echelon of command in the landing force must establish a secure and effective beachhead. Establishment of a beachhead is a condition to achieve during the assault, not an end in itself. The final beachhead will generally conform to the landing force lodgment area (as derived from analysis of the amphibious task force mission).

The landing force commander must tentatively select beachheads for the next subordinate landing force command echelon. For example, when the landing force is a corps, the corps commander must consider possible division

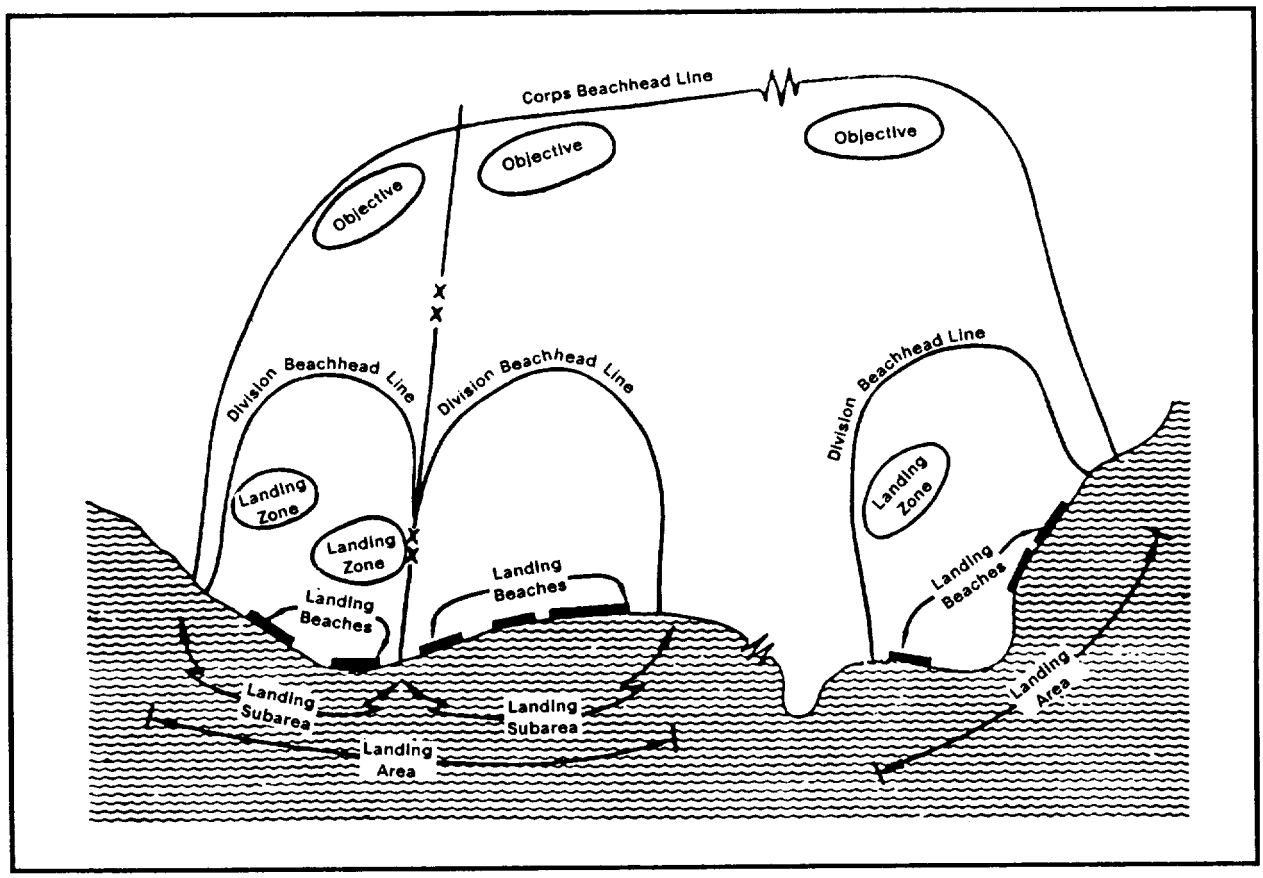

Figure 8-6. Beachheads and landing areas (schematic)

beachhead lines. Beachheads may be either separate and dispersed; or they may be zones of action defined by a boundary, within the beachhead of the next higher echelon. (See Figure 8-6.)

A landing area is that part of the objective area within which an amphibious task force conducts landing operations. It includes:

- The beach.
- Approaches to the beach.
- Transport and FS areas.

Ž The air occupied by close supporting aircraft.

- The land included in the advance inland to the initial objective.

When two or more divisions execute assault landings, they use more than one landing area, or divide the shoreline within a single landing area into two or more landing subareas. After selecting a general landing area, the landing force commander divides the usable shoreline into zones of action for subordinate echelons. He selects landing beaches within the assigned zone of action to support his scheme of maneuver ashore.

The landing areas selected must satisfy both naval and landing force requirements. Considerations are the—

Ž Ability of naval forces to support landings and subsequent operations.

Ž Degree of shelter from unfavorable sea and weather conditions.

- Suitability of the beach for the assault ships and craft employed.
- Extent of mineable waters and conditions affecting the ability of the enemy to defeat mine countermeasures.
- Capabilities and dispositions of the enemy.

• Feasibility of improving unloading facilities, including early seizure and rehabilitation of the port.

Ž Suitability of the landing area for ease of tactical maneuver ashore to attain rapidly the final objective.

Ž Suitability of landing sites.

• Nature of terrain inland from the beaches.

Ž Adequacy and accessibility of routes away from the beaches.

• Suitability of the area for administrative support activities.

The naval component commander delineates the sea areas and air space required to establish each beachhead the landing force commander has selected. The amphibious task force commander designates the combinations of sea and beachhead areas as possible landing areas. He also indicates their relative desirability.

In developing his concept of operations ashore, the landing force commander selects primary and alternate landing areas from among those the amphibious task force commander has designated. He maintains continuous liaison with interested commands regarding constraints on operations. He selects those landing areas which will best aid in accomplishing the landing force mission. He then coordinates his final selections with other component commanders and the amphibious task force commander. He ensures their concurrence with the selected landing areas-given the abilities of sea and air forces to support these operations.

Concept of Operations Ashore

After determining suitable landing areas, the landing force commander outlines his primary and alternate concepts of operations ashore. The offensive ashore to seize objectives on the ground is the end for which the amphibious assault is the means.

Naval and air components must be able to support the concept of operations. This is a prerequisite to detailed planning. The landing force commander's concept of operations must be detailed enough to reflect—

Ž Basic assumptions.

Ž Designated objectives.

Ž General scheme of maneuver.

Ž Formation for landing in task organization.

Ž Beachhead lines.

Ž Ship-to-shore movement means.

Ž Fire support.

• Plans for any subsidiary operations.

When other component commanders concur with the landing force commander's concept of operations, he issues planning guidance to his subordinates.

Armored-Light Considerations

Armored divisions normally are not used in the assault phase of an amphibious assault. However, in certain situations, armored units (brigade sized or smaller) are landed with infantry to seize key terrain in the landing area.

In large-scale amphibious operations, infantry may secure a beachhead followed by an armored division or a brigade to increase firepower, mobility, and shock effect. Cavalry and air cavalry units may undertake reconnaissance and security missions before, during, or after the assault landing. Ground cavalry units usually conduct operations during and after the landings. They maintain contact between widely separated landing forces or may seize lightly defended objectives.

Basic Considerations for Units

Planning for amphibious operations begins with receipt of a directive from higher headquarters and continues for the duration of the operation. Planners must consider—

Ž Mission and concept of operations of the landing force.

Ž Enemy disposition and capabilities.

Ž Terrain, weather, and hydrography of the landing area.

• Troops, tanks, ships, assault and utility helicopters, and landing craft available.

•Logistics-over-the-shore (LOTS) capabilities available.

The directive for an amphibious operation, intelligence reports, and information about available shipping are the basic tools with which to begin planning. Essential to planning is the continuing receipt of intelligence and timely requests for additional intelligence products.

Preparation of Tentative Plan

An armored unit OPCON to an infantry division participates in preparing the division's plan. Specifically, the unit commander considers armored or mechanized units in detail and makes recommendations on—

• The total number and type of armored units to employ.

• Task organization.

Ž Missions and objectives.

Ž Place and manner of landing.

Ž Time of landings.

Ž Coordination with naval gunfire air, artillery, infantry, and engineers.

• Antitank protection.

Ž Special measures for communication, supply, and maintenance.

Ž Special requirements.

• Requirements for assault shipping and landing craft.

Organization for Combat

Armored battalions may be under the division's control or attached to a brigade. Commanders may employ them as a unit, attach one or more companies to infantry battalions, or employ them as the nucleus of a tank or armored task force. Commanders cross load key weapons systems and units to minimize complete capability loss.

The landing force commander must resolve the requirements to separate tactical units on the one hand and centralize or distribute support elements on the other. He must specify how to do this in his plan for combat. He must review this issue continuously during the operation. Command relationships may be in effect before embarkation or on landing, depending on the landing plan.

Landing Plans

The most important point of a landing plan is that it must support the scheme of maneuver of the landing force ashore. Some basic considerations for armored units are—

Ž They must be ashore early to assist dismounted infantry in seizing initial objectives rapidly or to perform reconnaissance and security.

• They are a valuable weapon in protecting landing forces from early attack by mechanized forces.

Ž If they land early, armored units tend to reduce casualties among the dismounted infantry. They are a morale factor in early stages of the assault.

Ž Armored units should land early when the mission demands tanks as part of a task force.

• Key pieces of equipment and units are cross loaded to avoid complete loss of capability.

Armored units or vehicles may land in a scheduled wave or by the on-call method. This method is appropriate when conditions ashore are unsatisfactory for the landing of vehicles and the beach must be prepared for landing. The method selected should best suit the situation. It should also be the most efficient method of ship-to-shore movement. The division may organize armored units for the landing by either of two methods:

Ž Units are attached to a brigade landing team for the landing and assault of the beach.

Ž Units remain under the command of the armored unit commander until they have landed. Attachments to accomplish task organization may become effective upon landing or as stated in orders.

Embarkation Plans

The use of large-capacity landing craft and ships, and the time required in loading and unloading, demand detailed planning for embarkation. The anticipated tactical employment of the division determines the type and number of helicopters landing craft and landing ships required. Several factors govern the determination of the type of landing vehicle, including—

• Scheme of maneuver.

• Characteristics of the beaches.

• Presence or absence of offshore obstacles.

When possible, tactical considerations should govern the planned use of shipping. However, available shipping will seldom support the tactical plan without adjustment.

When shipping assignments have been made, unit embarkation officers prepare ship-loading forms and submit them to the ship's commanding officer for approval. When approved, they constitute the final loading plans and govern the loading of the ship. Changes can be made only with approval of the ship's commanding officer and the commanding officer of the troops concerned. Unit leaders should refer disagreements to the next higher level of command for resolution.

The DTO is responsible for division surface movement planning. Navy and Marine Corps personnel may be attached to maneuver battalions to serve as unit embarkation officers.

Logistics Plans

The division's tactical plan (and the logistics plans of higher echelons) determines logistics requirements. No rule determines the supplies which units carry and those higher echelons provide. The division determines the equipment and supplies each echelon will carry. It bases its directives on the overall plans for the operation and previous usage factors. Means of logistic support depends on the—

• Duration of the operation.

• Shipping available.

Ž Type of operation.

• Estimated date of arrival of supply shipping.

Ž Method and means of unloading.

Ž Size of the objective.

During the planning phase, units must procure supplies and equipment required for training, embarkation, and initial phases of the actual operation.

Units must obtain fuel, ammunition, rations, repair parts, and special supplies and equipment. This includes waterproofing equipment, cold weather equipment and clothing, special munitions, and vehicle accessories or attachments.

Shipping

The type of shipping available to the division affects landing. Ships suitable for landing armored vehicles are landing ships and landing craft. Ships differ in their capabilities, cargo, and troop capacity. The commander can develop final embarkation loading plans only after studying characteristics of the ships used. These characteristics are described in the ships' characteristics pamphlets. Direct liaison with ships' officers will also provide information.

Preparation for Embarkation

Unit embarkation officers and Navy commanders prepare loading and embarkation plans for units before the arrival of assault shipping at the embarkation point. Vehicle crews and maintenance personnel embark with their vehicles.

For each ship, the commanding officer of troops and the ship captain's representative arrange other details of embarkation. These include—

Ž Assignment of personnel to billets and working parties.

Ž Stowage of fuel, lubricants, and maintenance materiel so that these items are available for servicing vehicles and weapons.

• Organization of security and messing procedures aboard ship.

• Provisions for use of ships' equipment and personnel to assist in servicing equipment *en route.*

Ž Provisions for en route training if feasible.

Embarkation

Units must maintain unit integrity as they embark. Normal organization for combat must remain unchanged. The landing ship, docks (LSDs) and landing ship, tanks (LSTs) because of their greater capacity, assist in maintaining unit integrity. To expedite the loading operation, personnel must be familiar with different methods of ship loading. This often requires extensive training.

Movement to the Objective Area

All personnel must understand their duties and be thoroughly familiar with the overall plan. Each leader must know the relationship of his mission to the overall plan in the amphibious attack. Briefings for personnel emphasize the—

ŽMission.

ŽScheme of maneuver.

•Details of the beach assault.

ŽProcedure for the ship-to-shore movement.

ŽLocation and methods of communication with CPs, liaison personnel, and the naval control organization.

•Condition of beaches, nature of obstacles, beach exits, terrain inland, and terrain trafficability.

•Plans for location of maintenance and supply facilities ashore.

Ž Enemy situation.

Unit leaders should disseminate to all personnel intelligence information received during the movement. Vehicles should be loaded so they are accessible for servicing during the voyage. Designated personnel must plan, schedule, and perform daily servicing and final preparation for combat. This includes—

•Prestarting checks.

•Daily running of engines.

•Constant preventive maintenance on armament and communications equipment.

Ship-to-Shore Movement

Landing craft and landing ships influence the ship-to-shore movement of units. If a waterborne deployment of combat units is necessary to seize defended beaches, assault forces land from dispersed shipping in waves of small craft and amphibian vehicles over widely separated beaches. Heavy forces should land early so they may facilitate the infantry's seizure of initial objectives.

Personnel should preload in landing crafts, utility (LCUs) or landing crafts, mechanized (LCMs), which then launch from LSDs in the unloading area. Landing craft then assemble and proceed as a group to the LD. They either deploy and cross in scheduled waves, or layoff in a designated area awaiting the order to land in on-call waves.

Because of the shallow draft of the LCU and LCM, vehicles should make a relatively dry landing. However, they need guides—individuals, markers, or buoys-to ensure they reach shore without striking mines or other obstacles.

Once ashore, armored units join infantry units. These task-organized units will execute the beach passage, seizing enough ground to protect the beach from small-arms fire. These units continue to expand the beachhead and execute the mission in accordance with the force commander's intent and OPORDs.

Time and Place of Landing

In an amphibious operation, armored units are needed as soon as the initial wave of assault troops land; therefore, they should land at the earliest possible time. Armored units may land in advance of, or with, the infantry against an undefended beach. However, a beach strongly defended by antitank weapons and obstacles prevents an early landing.

The commander must select a place and time of landing that supports the scheme of maneuver. The type and number of ships and crafts available to transport the force may determine where the unit lands and the rate of buildup ashore. The beach gradient, offshore reefs or sandbars, navigability of approach lanes, and waters surrounding the objective also influence choice of the landing site. Beach soil should be trafficable and its gradient gradual. It must have enough routes of egress to sustain momentum. It should support the scheme of maneuver. Offshore reefs barring passage of heavy landing craft, a poor gradient for beaching, poor trafficability, or the need to emplace causeways will delay the landing of armored forces.

Breaching teams must overcome or breach minefield and obstacles before the main unit landings. This minimizes losses and sustains the momentum of the attack. They should avoid natural or manmade obstacles offshore, on the beach, or inland or should select a site where they can breach the obstacle most easily.

In selecting the landing site, the commander must consider trafficability inland from the beach. Terrain inland should provide ample maneuver area, a suitable road net, and cover and concealment.

Obstacle Clearance and Breaching

Navy and landing base specialists must clear beach and underwater mines and obstacles rapidly. Navy underwater demolition teams clear underwater obstacles seaward of the highwater mark, usually during the preassault phase. The landing force clears mines and obstacles inland from the highwater mark. Time seldom permits removal of all obstacles. Only certain routes across beaches will be clear for passage early in the landing. It is often necessary to alter the prescribed landing formation and submit to some canalization during the beach passage. To reduce lateral movement to reach the cleared lanes, units on the beach must immediately relay information to commanders of LSTs and appropriate control vessels. This enables units afloat to land as closely as possible to the cleared lanes. Lanes selected should correspond to planned landing points. They must ensure—

- Sufficient breadth to accommodate vehicles.
- Sufficient numbers to permit rapid egress from the beaches.

ŽAccess to a road net or trafficable area.

ŽA minimum of lateral movement after units have landed.

- Identifiable landing points leading to cleared lanes.

These lanes are of primary importance. If armored forces are used, their personnel and equipment should assist in clearing them. Reconnaissance personnel join with engineers to form teams. They assist in the demolition and removal of obstacles and selection and marking of lanes. They also guide vehicles through lanes. Other support includes the tank-mounted bulldozer, landing vehicle, engineer or combat engineer vehicles for obstacle removal, and armored vehicles for obstacle destruction and team protection. Analysis of specific obstacles determines the organization of mine and obstacle breaching teams.

Breaching teams should land with the leading waves, often with the first wave. Each team clears at least one vehicle lane 18 to 24 feet wide.

Guiding Vehicles Ashore

Landing conditions may require units to cross reefs, tidal flats, or other areas covered by shallow water. Operators must guide vehicles around obstacles. An amphibian tractor can guide vehicles ashore after debarkation. If this method is used, a guide vehicle should be designated well in advance of the landing to allow for briefing and communications planning.

A crewman may dismount and become a guide by wading ahead of the vehicle. This method is slow, especially if the water is deep or the bottom is rough. Guides are vulnerable to hostile fire. This method is satisfactory for short distances only.

Passage of the Beach

To avoid congestion and losses at the waterline and on the beach, units must carefully plan and coordinate passage of a beach area. They must conduct it aggressively. Liaison, reconnaissance, and breaching teams must perform their tasks quickly and thoroughly. As the vehicles emerge from their landing craft, guides meet them and direct them through cleared lanes to points from which they will support the attack. Armored units may support the infantry beach assault with small-arms fire from machine guns while engaging hard targets with main guns. Bulldozer tanks or combat engineer vehicles cover openings and entrances to emplacements. They aid in breaching operations inland. They can help improve the newly seized beaches if the tactical situation ashore permits.

Integrated assault teams transported in vehicles can make mass landings against undefended beaches. They can debark from landing ships directly onto the beach and attack inland.

During ship-to-shore movement, unit commanders should receive information by radio from their reconnaissance and liaison personnel ashore. This includes such information as the condition of the beaches, progress of beach clearance efforts, and recommendation of the best beaches for vehicles to land on. After landing, these

personnel meet vehicles at the edge of the water. They inform commanders of the best routes across the beach. Guides then lead them through the cleared lanes.

If intelligence is complete, no mines are on the beach, and hydrographic conditions are favorable, armored units may land in the first wave. They should land from two to five minutes ahead of the initial wave of infantry. The commander must time the landing and the initial wave of troop-carrying craft precisely to obtain maximum effect from shock and firepower. He should provide infantry support early on in the assault. If there is heavy enemy resistance at the waterline, armored units should land in a line formation to exert maximum firepower on the enemy.

Rehearsal

The rehearsal of the amphibious operation is critical. Participating forces should conduct one or more exercises under conditions approximating those anticipated for the actual operation. Units should conduct rehearsals according to a plan which approximates the plan for the actual operation. Responsibility for rehearsal planning is the same as for preparing the actual operation plan.

WINTER AND COLD WEATHER OPERATIONS

Extreme cold weather conditions pose significant operational problems for infantry divisions. In more temperate climates, many conditions discussed in this chapter have a minimal operational impact. In the cold, however, these same conditions are a matter of life and death. Proper equipment, training, and strong leadership can overcome cold weather problems and complications. Winter and cold weather operations include operations in snow, any cold region of the world, the far north, and in northern latitudes. World Wars I and II and the Korean War all included cold weather operations. Ten German divisions operated under arctic conditions in northern Finland in World War II in an area about 400 miles wide, while the Russian Army used 47 divisions in winter operations against Finland in 1939. Future global or regional conflicts may require divisional operations in a winter or cold weather environment. FM 90-11 is the Army's base doctrine on cold weather operations. This chapter provides an overview of environmental considerations for such operations.

The Commander

Commanders must approach operations in cold weather in a positive manner, exploiting advantages and reducing disadvantages as much as possible. They must emphasize the feasibility of operations, and transmit their confidence to their subordinates.

Commanders face no changes in doctrine or principles and, in general, use tactics suitable for the terrain. However, operations in cold weather regions pose additional difficulties which greatly complicate C^2, maneuver, FS, and CSS missions.

Although the fundamental principles of warfighting apply, special characteristics of operations in cold weather increase commanders' responsibilities. Commanders must consider the use of special clothing and equipment and expedients and improvisations for living and moving in the cold. With proper training, suitable equipment, and effective, resourceful leadership, light infantry divisions can operate without significant loss of strength or effectiveness in the cold.

Winter and Cold Weather Considerations

Whiteout

A whiteout is an atmospheric phenomenon in which the light from the sky is about equal to that of the snow surface, and a uniformly white glow appears to engulf observers. Whiteout occurs over an unbroken snow cover and beneath a uniformly overcast sky. Blowing snow can also cause whiteout. Shadows, the horizon, and clouds are no longer visible. Observers lose depth perception and become disoriented. They can only see very dark and nearby objects. These conditions affect observers in the air as well as on the ground and increase soldier fatigue.

Greyout

Greyout occurs over a snow surface during twilight conditions or when the sun is close to the horizon, and when the sky is overcast with dense clouds. Surroundings have an overall greyness. The absence of shadows causes a loss of depth perception, increasing the hazards of landing aircraft, driving a vehicle, or even walking. Under

certain greyout conditions, drivers find it almost impossible to distinguish the road from a ditch or snowbanks along the roadside. Greyout is similar to whiteout. In greyout conditions, the horizon is distinguishable; during a whiteout, it is not. This condition can be overcome by the use of night observation devices by pilots, drivers, and soldiers.

Ice Fog

Ice fog is a phenomenon common in inhabited areas when temperatures drop below -35°F. At these temperatures, stagnant air cannot hold the water vapor produced by human activities; the vapor materializes as ice fog. Sources of water vapor include vehicle and aircraft exhaust, steam from heating systems, and even air from humid rooms. In the field, such fogs may appear over troops, bivouac areas, motor parks, airfields, convoys, and gun positions, disclosing the location of military activity. Ice fog can obscure a gunner's vision even with a thermal sight. When combined with sotl snow blown up by muzzle blast, the condition may require a gunner to move to another position after the first shot. Ice fog can limit or negate the effectiveness of night vision devices (NVDs).

Snow Cover

Snow cover can increase the possibilities for movement and operations of suitably equipped and trained light infantry troops. It will significantly reduce the mobility of a force which lacks proper equipment and training. Snow cover reduces vehicle mobility, and snow over 1 meter deep will stop all wheeled vehicle movement. Wheeled vehicles can operate on established roads and in rear areas only. Full-track vehicles with low ground pressures are best for movement over snow-covered or muddy terrain. Deep snow often limits depth in combat missions because movement is slow. Snow depths over 24 inches will almost entirely stop movement on foot without the aid of snowshoes. Reconnaissance by patrols on skis, snowshoes, or in light oversnow vehicles should precede unit movement. Reconnaissance reports should include information on snow depth and ice thickness. Snow and ice increase the maintenance requirements of equipment and weapons systems. Snow cover reduces the effect of all weapons fires. The effects of field artillery or mortar fire are significantly reduced by deep snow.

Ice Cover

The freezing of rivers, lakes, and swamps can increase the possibilities for maneuver. Waterways that are normally obstacles in summer can become frozen routes of advance and LOCs in winter, making extensive cross-country movement possible.

Extreme Cold

Extreme cold slows activities by numbing soldiers and increasing the need for maintenance of weapons and materiel. Activities which normally require only minutes may require hours in extreme cold. Oversnow movement is extremely slow and requires periodic stops to set up warming tents for the thawing of water and rations and for soldiers to combat the effects of numbing cold. Troops require special clothing and heated shelters and some equipment and supplies must be protected against freezing temperatures. Soldiers must winterize their weapons and vehicles with special lubricants. The commander must consider these factors in his planning. Proper planning and suitable clothing, supplies, equipment, shelter, transportation, and intensified training can reduce the effects of extreme cold.

Extreme cold affects equipment by making metal very brittle. Increased breakage of parts occurs in all types of weapons. Extreme cold also decreases ammunition velocity and accuracy. Bringing a cold weapon into a warm shelter causes condensation on the weapon which will freeze and cause a malfunction when it is taken back outside into the cold. Consequently, weapons are normally left outdoors unless brought in for maintenance.

Daylight and Darkness

Winter in arctic and subarctic regions brings decreased daylight and in some areas no daylight, Conversely, summer has long periods of daylight. The commander must not regard unusually long periods of either daylight or darkness as a bar to operations. In some situations, these conditions will actually aid operations.

Low-Population Density and Transportation Routes

Settlements, supplies, quartering facilities, and LOCs are normally limited in arctic regions. Their control or destruction may be critical. Roads and railroads may be limited and those that exist usually are vulnerable to enemy action. In addition, climatic conditions may greatly affect their use.

Lakes and waterways may either aid or hinder operations. They can be used as natural routes of communication or airstrips if covered with ice of sufficient thickness; however, drifted and hard-packed snow may make landing on ice difficult and require engineer preparation of an airstrip. In the summer, waterways maybe either major barriers or LOCs. Many rivers and streams are glacier-fed and carry great volumes of water and silt in summer. The amount of water may vary considerably during any 24-hour period. This is particularly true near a river's source when daytime temperatures are warm and nighttime temperatures are near freezing. Careful reconnaissance is required to determine changes in water volume throughout the day.

Mapping and Navigation

Lack of landmarks, large forested areas, periods of reduced visibility, difficulty of cross-country movement, and large magnetic declination variations (in extreme northern and southern latitudes) increase the difficulty of land navigation in some regions. Maps may be unreliable, or nonexistent. Therefore, GPS and aerial photographs become an important source of terrain information. With proper planning, engineer topographic units can convert aerial photography into photomaps. Unless the aerial photographs are properly laid out, annotated, and referenced to known survey points, they will not be accurate enough for navigation and indirect fire weapons.

Weather Variations

Sharp variations in weather are common in cold weather operations. These include severe frosts, mild spells, thaws, rain, sudden freezing, snowstorms, strong winds, and dense fogs. Rains can halt an attack by making off-road movement impossible. Conversely, a hard freeze can make a defensive position vulnerable by converting soft lowlands, or even rivers, into avenues of approach.

Accurate weather forecasts are essential to guard against the harmful effects of weather and to seize tactical advantage. The division weather section and its weather prediction capabilities are extremely important. The commander must consider favorable conditions of even short duration as a combat power multiplier over the enemy.

Seasonal Transition

Climatic changes are abrupt as seasons change. A frozen river may become a major obstacle as the ice breaks. Temporary roads and airfields disintegrate, and permanent ones become unusable. Rivers flood. Terrain changes rapidly. Winter field fortifications can become unusable. In the arctic, areas underlaid by permafrost become bogs in summer. When possible, air reconnaissance should be used to determine possible routes for movement.

The freezing season is shorter and has less effect on movement than the break-up season. The best time for operations is when ground and waterways freeze sufficiently, but before deep snows arrive. Careful planning is essential. In winter, clothing and shelter must protect against cold; in summer, they must protect against water and insects. Large numbers of mosquitoes are common in arctic regions during warmer months. They can severely impact operations if troops are not properly equipped. Camouflage patterns also must be altered.

Delayed Responses

Extreme cold increases the time required to perform even simple tasks. Everything is done at a slow pace and takes considerably more time. Troops conducting movement require additional time to adjust clothing and equipment and, many times, must set up warming tents en route. In cold weather, soldiers must be supervised to ensure they consume sufficient quantities of food and water. soldiers often resist performing routine hygiene functions due to the extreme cold. The establishment of buddy teams within an organization can assist in reducing cold weather injuries.

Operations

Errors or miscalculations in planning extreme cold weather operations may be disastrous, and corrective action, difficult. Synchronizing air and ground forces is more difficult in the cold.

Planning for logistics support must include increased fuel, shelter, and clothing requirements; the need for special equipment; and the need to modify standard items. Plans must provide for alternate means of supply and for increased use of air transport in supply and evacuation. Soldiers will be able to move only the minimum of essentials. Austere living and self-sufficiency are critical to economy in the use of supplies.

Reconnaissance

Operations in extreme cold are vulnerable to ambush and delaying tactics. Reconnaissance ahead and to the flanks of an advancing column is critical. Detailed reconnaissance before committing the main force avoids delay, misdirection of effort, fatigue, and unnecessary exposure of troops to the cold. Reconnaissance troops must be mobile, but still carry life support equipment. They must maintain communication with the main body at all times.

Security

Short hours of daylight and storms may restrict enemy air operations. However, the weather may also limit air and ground observation of the enemy. Dense forests provide a natural screen against air observation for elements not using roads or familiar trails. In open snow-covered areas, the use of a white covering for clothing and equipment increases protection against observation.

Extreme cold decreases the importance of water obstacles. However, concentrated artillery fire, air bombing, or deliberately placed demolition charges may turn frozen areas of water back into obstacles or traps. One foot of solid ice will carry light tanks while 3 to 4 feet of ice will support virtually any load. Snow over 18 inches deep will limit or completely stop use of wheeled combat vehicles except on cleared roads. It may also hamper operation of track vehicles.

Mines improperly placed will be ineffective in heavy snow as tanks press them deeper into snow without exploding them. If used, mines should be placed on a hard surface underneath the snow.

Offensive Operations

The commander must consider climatic conditions and sudden weather changes in planning offensive operations. Heavy snow may fall during an operation, restricting movement and mobility. It can also hinder movement of the enemy's reserve. A sudden thaw may prevent cross-country movement and cut off troops from adjacent friendly forces. Fog and low clouds can develop quickly and obscure observation. The commander should receive frequent weather reports to aid in decision making before and during operations.

If possible, the attacks should avoid heavy forests and snowdrifts. Terrain corridors between wooded areas are preferable to stream valleys, as the latter usually contains deep snowdrifts. The objectives of the attack are critical terrain features which dominate the roads leading away from the enemy's position. Their seizure will normally prevent withdrawal, reinforcement, or resupply and may cause the enemy's eventual surrender or annihilation.

Defensive Operations

In general, reasons for assuming the defense apply in all environments. Maneuver units may have to assume the defense due to extreme cold weather phenomena such as breakup, freeze-up, severe snowstorms, and extremely low temperatures. Units may deliberately assume the defense to tempt (or compel) the enemy to attack under unfavorable conditions such as through long, narrow passes, deep snow, or across obstacles where movement is difficult and firepower ineffective. This forces the enemy to fight under exhausting conditions while the defender occupies better shelter and has shorter supply lines.

The commander uses extensive reconnaissance to find the enemy flanks and rear and prevent surprise attacks. Highly mobile units should be used to harass the enemy's rear, forcing him to use combat forces for security tasks. They cut LOCs and destroy his bivouacs, supplies, and other installations. Destruction of the enemy's shelter places him in immediate jeopardy. This

can permit taking the offense as soon as the situation allows.

Wide frozen streams and lakes afford little or no cover to the attacker and provide excellent fields of fire for the defender. Under mild temperatures, keeping the ice of these lakes and streams broken up for a distance of 20 to 30 feet from shore creates a difficult obstacle. Heavily wooded areas and open areas relatively free of snow favor the attacker. Special attention must be paid to these areas and they should be defended in strength and in depth.

In conditions of extreme cold, the organization of a position requires special tools and explosives. Ordinary entrenching tools are ineffective. The location of a defensive position on the crest of a hill or ridge will usually be effective. Enemy tanks and personnel will have difficulty ascending a steep slope covered with snow.

The defender holds his most mobile troops in reserve. Because of difficulties in movement, the commander should keep his reserves closer to the probable area of employment. Maneuver units normally counterattack against the flank of an attacker. In deep snow, the enemy may be unable to change his orientation in time to meet a counterattack on his flank by mobile forces.

The defender continually improves LOCs. He opens paths between frontline positions and rear areas, and in the directions of reserve employment. The commander should position reserve units to cover thoroughfares to prevent use by the enemy.

DESERT OPERATIONS

The term desert covers a broad spectrum of arid environments, ranging from the rolling sands of the African Sahara to the mountainous and wadi covered American Mohave. These areas have certain characteristics which affect military operations: lack of water, limited vegetation, large areas of sand, extremes in temperature, and brilliant sunlight. FM 90-3 is the Army's base doctrine on desert operations. This section does not describe how to conduct desert operations, it provides an overview of the impact of the desert environment on men, equipment, and military operations.

The Desert Environment

Mountainous deserts have scattered ranges or areas of barren hills or mountains separated by dry, flat basins. Most of the infrequent rainfall occurs on high ground and runs off rapidly in the form of flash floods. These create deep gullies and ravines, and deposit sand and gravel around the edges of the basins.

Rocky plateau deserts have relatively slight relief and extensive flat areas with solid or broken rock at or near the surface. They may have shallow, but sharply defined, steep-walled valleys, called wadis. Although their flat bottoms and concealment may seem attractive as CP locations, wadis can be extremely dangerous to soldiers and equipment because of flash flooding after rains.

Sand or dune deserts are extensive flat areas covered with sand or gravel. Areas may be totally flat for several kilometers. Plant life may vary from none to scrub brush over 6 feet high. Temperatures may exceed 100°F during the day and fall to near freezing at night.

Impact on Operations

Mobility

The key to success in desert operations is mobility, clearly evident in ground operations in Operation DESERT STORM. The tactics employed to achieve victory over Iraq were wide, rapid flanking movements similar to those Field Marshal Rommel and Field Marshal Montgomery demonstrated in North Africa. Trafficability and cross country movement are critical to the tactics of desert operations.

Trafficability and cross country movement are generally good. However, salt marshes can create no-go conditions during the wetter season. Sand can bog down traffic and make foot movement slow and exhausting. The steep slopes of dunes and rocky mountains can make vehicular movement impossible. The wadis create cross-compartmented terrain, with their banks steep and unconsolidated. When it rains, wadis become dangerously rushing streams of water, turning flat lake beds into seas of mud. In rocky terrain, sharp angular debris punctures tires easily. But, overall, movement is mostly uninhibited. With

ample fuel and water resources, units can go around these natural, as well as man-made, obstacles.

With the desert's loose surface material, movement can be easily detected because of the flying sand and dust. In an actual engagement, this cloud may obscure a unit, thus protecting it from direct fire as it advances. But the element of surprise is probably lost.

Moving at night may be the logical choice. The dust is still there, and vehicles (which should be widely spaced) can get separated. But there is no worry about enemy detection from the sun's rays reflecting on glass, mirrors, or metal. This can give away movement and positions at distances of up to 20 kilometers.

With the ability to make fast wide flanking movements, a unit can encircle and cut off enemy forces. The Israeli forces under General Ariel Sharon did just that to the Egyptian Third Army in the 1973 War. The British did the same to the Italians in North Africa in January 1941. In Operation DESERT STORM, the night-fighting AH-64 helicopters, combined with field artillery fires, were an unbeatable team. An armored force raced to the Euphrates River and attacked Republican Guard positions, cutting off and destroying Iraqi divisions.

Land navigation is a challenge during movement in many arid regions. There are few landmarks to key on, and maps and even photos can become dated quickly, especially in the sandy deserts where dunes migrate. The GPS with the small lightweight GPS receivers (SLGRs) is a major aid for desert operations.

Refuel and resupply operations require periods in which forces assume the defense, but only temporarily. Compared to rocky plateau topography, the flat sandy desert topography that is characteristic of Saudi Arabia is not conducive to defense. In mountains and canyons, a defensive posture can be favorable. Controlling the passes can essentially close off vast areas to an attacker and make it extremely costly for him.

While a unit is in the defense, it needs both ground and air reconnaissance to detect movements at long range and as early as possible. Obstacles must be placed in all types of topography, primarily to slow advances and channel columns. Neglecting these security measures in the flat sandy regions can lead to disaster.

Reports from commanders in DESERT STORM indicate that the enemy was engaged early and at the maximum ranges of weapons systems. In some cases, observed fires had to be used because the enemy could move so quickly. OH-58 helicopters, used with AH-64s and long-range artillery systems, were the means to this end. But, generally, the Iraqis moved little, and unobserved fires, using IMINT, resulted in substantial kills.

Observation and Fields of Fire

Observation and fields of fire are generally excellent in most desert areas. Open terrain and a predominantly clear atmosphere offer excellent long-range visibility and permit direct fire weapons to be used to their maximum ranges. However, range estimation by "gut feeling" may be subject to error. The effective ranges of weapons can easily be reached. Correct estimation of maximum ranges is critical for all weapons, especially for wire-guided munitions.

There are two primary considerations when using weapons in the desert environment: longer-range observation, and fields of fire at the maximum effective ranges. Rapid heating and cooling of the atmosphere can hinder these factors, however, and causes distortion of ranges to the aided and unaided eye. Mechanical and electronic means, such as ground surveillance radars and laser range finders, must be used to verify estimated ranges. Weapons must be bore sighted and zeroed more frequently at standard ranges.

The desert is not absolutely flat, so weapons are sited to provide mutual support. Dead space may be a problem. Even though the landscape appears flat, closer inspection may show it to be undulating with relatively deep wadis and depressions. These areas must be covered by indirect fire.

When on the offense, attacks should be initiated with the sun at or near the attacker's back whenever possible. This eliminates most shadows that degrade optical weapons guidance and make visual target acquisition difficult.

When there is no usable dominant terrain available, observation may be accomplished from the air.

Other visibility problems are caused by heat distortion, which results from heat waves at the desert surface. Heat distortion causes images to shimmer, making positive identification difficult and degrades depth perception. Also shines and reflections must be avoided. Range finders to verify correct distances and bracketing techniques with large adjustments can aid to hit an enemy target with artillery.

If optical vision is hopelessly distorted, radars can be valuable and they are unlikely to be affected by the haze of midday heat. However, radars are almost useless in sandstorms.

Image intensification, which depends on the phase of the moon at night, is also of limited value in sandstorms. If there is no moon, artificial illumination outside the field of view of the system is used. Since thermal imagery devices depend on the difference between ambient temperature and equipment temperature, they are more useful at night than during the day. Because of the distinct advantages, they should be used as the primary sighting systems for vehicles so equipped.

Observation of fires, especially direct fires by tanks, may be difficult due to dust clouds. Correction of field artillery fires, especially those of larger pieces, may be complicated by dust hanging in the air following the impact of ranging rounds. Forward observers should consider placing initial rounds beyond a target rather than short of the target.

Cover and Concealment

Cover and concealment are generally scarce in the desert. The flat sandy deserts provide little if any natural cover or concealment, especially from aerial attack or reconnaissance. Ground concealment and protection from fire can be found behind dunes or in wadis. When using wadis for ground concealment, soldiers must be aware of the potential for flash floods.

Some arid regions have vegetation that can provide limited concealment from ground observation. In rocky, mountainous deserts, cover and concealment are best behind boulders and in crevasses. Daytime vehicular movement eliminates nearly any possibility of surprise, as dust trails created by the traffic can be spotted for miles. At night, noise and light discipline is critical. Both sounds and light travel great distances because of the unobstructed flatness and atmospheric stability. Camouflage can be very effectively employed to improve on natural cover and concealment.

Obstacles

Natural obstacles do exist in the desert, and arid legions are well suited for man-made obstacles. The wadis and steep slopes of escarpments, mountains, hills, and dunes hinder cross country movement. Sand dunes may stretch for miles and prevent direct movement across their length. These sand dunes are often more than 100 feet high and consist of loose sand with high, steep downwind faces that make vehicular traversing next to impossible. In the DESERT STORM area, the salt marshes have a crusted top that deceives vehicle drivers. These dry lake beds can become obstacles, especially in the wetter seasons when the water table is higher. A top crust forms on the surface, but below the crust, the soil is moist, similar to marsh conditions. The surface looks like it will have good trafficability, but the crust collapses with the weight of a vehicle, which becomes mired. The high premium on fuel and time makes it costly to go around these natural obstacles. Aerial reconnaissance immediately before any large movement is highly advisable because sand dunes migrate with shifting winds; they may not be where maps or even photographs show them.

Sandy deserts are ideal for employing minefield. Although windstorms can reveal previously buried mines, these mines can still channel movement and deny access to certain areas. The battles of the Bi'R Hacheim Line and El Alamein were influenced by minefield. Other obstacles include ditches, revetments, and barriers made by bulldozing sand mounds or by blasting in rocky mountainous areas to close passes. The Bar Lev Line along the Suez Canal is an example of such a barrier.

Key Terrain

Key terrain in the desert can be any man-made feature, a mountain pass or a source of

water, and, of course, high ground. Because there are few man-made features in the desert, those that do exist can become important, perhaps even key.

Roads and trails are scarce in the open desert. Complex systems beyond simple commercial links are not necessary. Routes joining oil or other mineral deposits to outlet collection points supplement these road systems. Wells, pipelines, refineries, and quarrying and crushing plants may have strategic and tactical importance. Pipelines are often raised off the ground, inhibiting movement. Rudimentary trails exist in deserts for use by minor caravans and nomadic tribesmen. Ancient posts and forts, usually in ruins, invariably command important avenues of approach. They frequently dominate the only available passes in difficult terrain.

Passes through steep topography are also likely to be key, again because they are so few. The North African campaigns of World War II focused on the control of passes, specifically the Sollum and Halfaya. In the Sinai Wars between Egypt and Israel, the Mitla, Giddi and Sudar passes were key. In Afghanistan, control of the mountain passes provided the Mujahideen safe haven from the Soviets. The oasis, where wells exist, become important for water resupply. The high ground is always a fair bet for key terrain. The relative flatness and great distances of some deserts, such as in Iraq, make even a large sand dune a dominant feature.

Avenues of Approach

Avenues of approach are not clearly defined in arid regions. The vast, relatively flat areas permit maneuver from virtually any direction. This point became obvious to units establishing defensive positions in Operation DESERT SHIELD. Wide envelopments are possible, as demonstrated in the DESERT STORM ground campaign. Modem sensor technology, limited natural concealment, and improved observation make the element of surprise a challenge. Yet, surprise was achieved during DESERT STORM. Iraqi commanders were shocked when they discovered US tanks in their perimeters.

Fuel is the major limitation when considering avenues of approach. The great distances a unit must travel to outflank enemy positions require huge amounts of fuel and complicate resupply. In mountainous and canyon topography, avenues are much more limited; the wadis and the valleys are likely to be the only possible access routes. Any roads that do exist are probably in the valleys. Nevertheless, none of the considerations outlined above are reasons to preclude the use of such tactics.

Techniques for Operating Vehicles

The best time to drive on sand is at night or early morning when the sand is damp and traction is better. By reducing tire pressure, vehicles may gain some traction. However, prolonged driving on partially deflated tires will overheat the tires and break down the sidewalls. Loads must be evenly distributed and operators must apply good driving skills to avoid harsh jolting of tires and extreme wear on tracks, wheels, springs, and shock absorbers.

Sandy deserts may be broken up by windblown dunes. Crossing dunes requires careful reconnaissance. Units should stay on the upwind side if possible. The wind may have built up sand around small scrubs forming small hills. Wheeled vehicles should not attempt to move through areas where this has occurred. Salt marshes, found in many deserts, are normally impassable, especially those with a dry crust of silt on top. A surface crust will cover some sandy areas, which may impede travel.

Vehicles should carry at least enough pierced steel planking or galvanized iron for the driving wheels. Sand mats are also effective; these are made of canvas, preferably with lateral strips of metal for strength and traction. Other essential emergency equipment includes jacks, jack blocks, tow ropes, shovels, axes, and picks for use in vehicle recovery. Winch-equipped vehicles should not normally lead movements.

JUNGLE OPERATIONS

Jungles occur in tropical and semitropical areas throughout the world. The US Army has a long history of fighting in jungles-in World War II, Vietnam, and, most recently, in Panama. Because Army contingency plans include many operations in jungle areas, jungle warfare for infantry division remains a distinct possibility.

FM 90-5 is the Army's base doctrine for jungle operations.

Jungle Environment

Jungles are characterized by dense vegetation, high temperatures (averaging 78 to 95°F), high humidity (90 percent), and heavy rainfall (1,000 centimeters or 400 inches per year). In jungles that are close to the equator, seasons are nearly alike, while further from the equator there are distinct wet (monsoon) and dry seasons.

Types of Jungles

Primary jungles are tropical forests with well-established trees. Primary jungles include tropical rain forests and deciduous forests.

Tropical rain forests have large trees whose branches interlock to form canopies. Canopies may form at two or three different levels, and prevent sunlight from reaching the jungle floor. As a result, there is little undergrowth. This makes movement by foot easier than in other types of jungles. However, extensive above-ground roots, hanging vines, and soggy ground makes vehicular travel difficult. Observation from the air is nearly impossible and ground observation is limited.

Deciduous forests are found in subtropical zones. In wet seasons, trees have their full foliage, while in dry seasons much of the foliage dies. Trees are less dense than in the rain forest, with more sunlight and rain filtering to the jungle floor and, consequently, more undergrowth. In the wet season, observation from the air and ground is limited and movement is more difficult. In the dry season, observation and trafficability improve.

Secondary jungles occur where the ground has been repeatedly exposed to sunlight, primarily at the edge of a primary jungle and in areas where jungles have been cleared and abandoned. Secondary jungles are overgrown with weeds, grasses, canes, and other vegetation. Foot movement is difficult, and ground observation is limited to a few meters.

Common Jungle Features

Jungle areas are not characterized solely by trees and undergrowth. In the tropics and subtropics, local areas in the jungles have special characteristics. These areas include swamps, savannas, bamboo thickets, and active or abandoned cultivated areas.

Swamps occur in low jungle areas or depressions with poor drainage where water can gather. Movement is normally limited to foot and small boats. Air and ground observation is limited.

Savannas are broad, open jungle grasslands in which trees are scarce and grasses thick and broad-bladed. Vehicle movement is easier in savannas than other jungle areas, but movement by foot is slow and tiring because of the tall, sharp-edged, dense grass. Observation varies from poor to good.

Bamboo grows in jungles throughout the tropics. Large stands of bamboo can obstruct vehicle movement. Troop movement through bamboo is slow, tiring, and noisy.

Cultivated areas include rice paddies, plantations, and small farms. Generally, observation is less restricted in cultivated areas. Ease of movement varies. Rice paddies are flat fields that are flooded during part of the year through a series of dikes and irrigation ditches. Paddies hinder foot movement when wet and generally prevent vehicle movement whether wet or dry. Plantations are large farms where tree crops like rubber and coconut are grown. The ordered rows of trees generally allow easy movement. Small farms are created by cutting down and burning off existing jungle vegetation. Crops are grown for a few years, then the farms are typically abandoned. These abandoned farms may hinder movement when they become overgrown.

Operations

Combat in the jungle is characterized by long periods of developing the situation and looking for the enemy, followed by short periods of violent and sometimes unexpected fighting. Jungle combat involves fewer conventional attacks and defenses, and more ambushes, raids, and meeting engagements. Heavy vegetation reduces observation and fields of fire, which makes high ground less significant as key terrain. Roads, rivers and streams, fording sites, and landing zones will likely be key terrain. However, the operational

orientation remains on the enemy, rather than on retaining or controlling terrain.

The range of TOWsand Dragons is very limited in the dense jungle vegetation. Artillery fire support is difficult to observe and adjust. TACAIR and helicopter weapons systems provide an alternative to conventional artillery fire support.

Navigation and Mobility

Topographic survey of jungle areas is mainly by air. Jungle maps will show large terrain features, but do not always show smaller features such as gullies, small swamps, and intermittent streams. Older maps may be inaccurate, especially in depicting trails and clearings that can be overgrow rapidly. Aerial photographs and information from patrols, local inhabitants, and others who have been in the area, can help update maps.

Heavy vegetation makes land navigation more difficult. Use of the compass and an accurate pace count are vital. If available, the best source of navigation is the GPS. Movement through the jungle is difficult and slow. Thick vegetation and lack of roads hinder vehicle movement. Dense vegetation, heat, and rugged terrain cause troops to tire quickly.

Communicatins

The jungle environment has a negative effect on communications. The dense foliage reduces the range of both visual and sound communications. Radio range is reduced, typically by 10 to 25 percent, due to thick foliage and rugged terrain. Rain and humidity can cause communications equipment to fail. Laying wire for communications takes more time. Aircraft may be needed to assist in wire-laying operations.

Offensive Operations

The jungle environment poses several challenges for the attacker. Thick foliage hinders C2. Seeing the battlefield is difficult and requires the coordinated use of security patrols, air and ground reconnaissance, and movement. The momentum and speed of an attack are difficult to maintain. Thick vegetation makes it difficult to move and accurately fire heavy weapons. The jungle does, however, provide concealment for infiltration. (See Figure 8-7.)

Defensive Operations

The density of jungle foliage impedes detection of approaching enemy forces and slows movement in reaction to an attack. Because foliage limits fields of fire and decreases visibility between positions, defensive positions normally must be closer together. The defending force must use OPs and NVDs to provide early warning, especially against infiltration attempts. (See Figure 8-8.)

Combat Service Support

Lack of roads in the jungle hinders resupply and evacuation. Air transport is critical for resupply but not always available. Soldiers must be able to move with only the minimum of essential supplies. Austere living and self-sufficiency may be critical to jungle operations.

RIVER CROSSING OPERATIONS

Infantry divisions may be required to conduct river crossings during both offensive and defensive operations. However, infantry divisions require extensive augmentation of engineers, FS, AD, chemical (smoke), MP, EW, and aviation (both lift and attack). FM 90-13 is the foundation for the conduct of river crossings.

Offensive River Crossing Operations

River crossing operations facilitate moving division units across the water obstacle so that there is minimum impact on the division's ability to move and project its combat power. Infantry divisions cross rivers via air assault, airborne, hasty river crossings, or deliberate river crossings. Divisions normally conduct river crossings as part of a corps operation.

Planning Considerations

The focus of offensive river crossing operations may be to destroy the enemy's defense in depth along with securing a bridgehead. If a bridgehead is to be used as a control measure, it must be large enough to accommodate the force and facilitate continuation of the operation.

Generating combat power across the river is crucial. Crossings should be conducted on as wide

Techniques:

Greater dependency on GPS and aerial observers as land navigation aids. Aerial observers provide course and route guidance.

Graphics tied to terrain features.

Phase lines may be used as a permissive fire coordination measure. Shifting from one phase line to another is event-driven. Flexibility and control of indirect fires is accomplished through an execution matrix. Boundaries are beyond maximum effective range of enemy and friendly direct fire weapons. Boundaries and restrictive fire control measures are positioned to allow immediate suppression missions, force protection, and security.

Control is achieved by assigning responsibility for an AO. Brigades identify objectives within commander's intent and available intelligence. In this scenario, 2d brigade in the north lacks information and intelligence on enemy strength and location. The 1st brigade in the south has better information. Aviation initially screens across the entire front. A boundary change occurs (affecting aviation) when 2d brigade crosses PL SKUNK.

Permissive fire control measures are facilitated during movement by a combination of aerial observers and GPS. The control measure is designated by GPS location plus a specified distance. Lacking favorable conditions, greater reliance is placed on aerial observers.

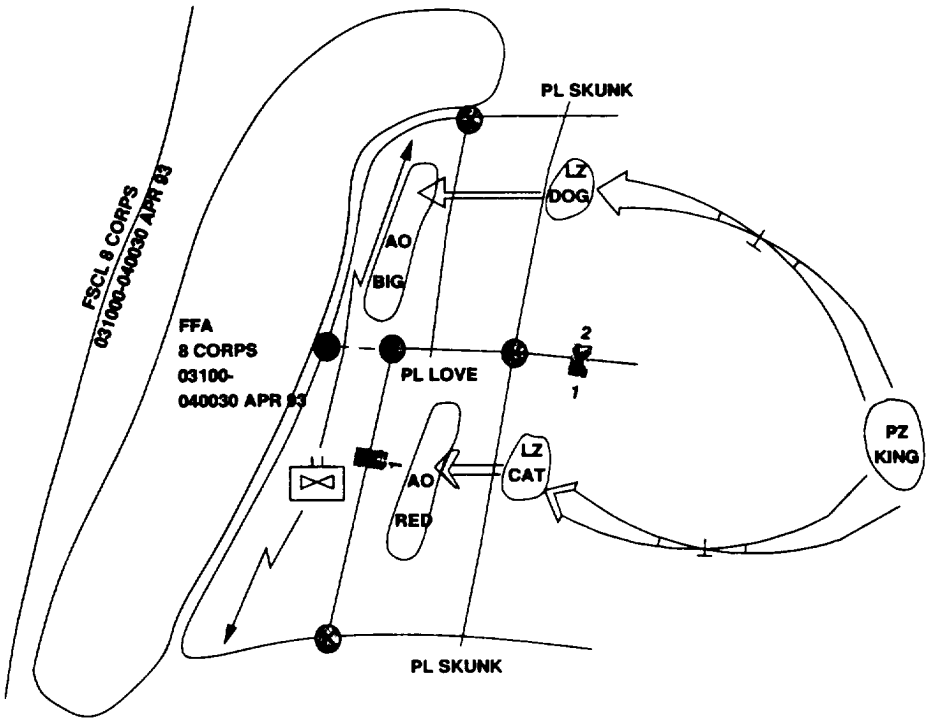

Figure 8-7. Example offensive jungle operations

a front as possible, using as many crossing sites as possible. Crossing at night, during reduced visibility, using obscurants, and developing a deception plan are all means to reduce the vulnerabilities inherent in river crossing operations.

Throughout a river crossing operation, the crossing force must be capable of defeating or blocking anticipated enemy reaction, including counterattacks, on the far bank. Plans must provide for a rate of crossing and buildup of combat power on the far bank that exceeds the rate at which the enemy can concentrate against the force. The crossing force secures sufficient space (bridgehead) on the far bank to provide adequate maneuver room and a depth sufficient to successfully conclude the river crossing operation.

Corps normally retains approval authority for river crossing operations to ensure that flanks are tied in with adjacent units. A further reason for corps control of the bridgehead planning is that

Techniques:

Use of GPS by maneuver units.

Control measures are established–

- Along linear terrain features in featureless terrain (deltas, coastal areas, flood plains).
- Along linear terrain features, prominent terrain or a combination of both in relief or featured terrain.

Increased reliance on aerial observers.

A greater need for coordination and control by subordinate brigades within their assigned sector.

Division aviation is assigned missions within its capabilities. The rear boundary of aviation units is a restrictive fire measure.

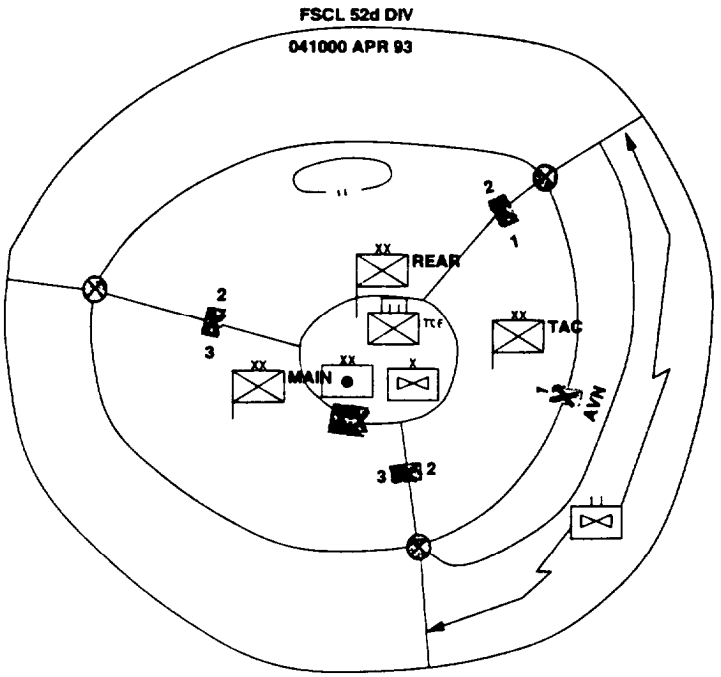

Figure 8-8. Example defensive jungle operations

although the actual assault is conducted by the divisions, substantial corps assets (such as artillery and engineers) are normally attached to the divisions to provide the necessary means to carry out the crossing.

Although a bridgehead line is the normal graphic used to designate the forward boundary of the bridgehead on maps or overlays, other combinations of graphics may be used, depending on the degree of control desired by the control headquarters. In lieu of a line, a series of key terrain features that mark the desired trace may be shown as objectives, thereby defining the bridgehead. A combination of a line and objectives may also be used.

The area comprising the division zone within a corps bridgehead is called the division objective area. It is bounded by the corps bridgehead line in zone, the division's flank boundaries, and the river itself.

Provision should be made for flank security of the bridgehead by tying the ends of the bridgehead line into the river obstacle itself. Where possible, flanks should include good defensible terrain.

A river crossing plan may be a separate OPLAN or OPORD or it may be an annex to an OPLAN or OPORD. If the primary or sole task is to secure a bridgehead, it is normally prepared as an OPLAN or OPORD. If not, an annex is

prepared. In either case, the format resembles a complete order. Divisions routinely phase their river crossing operations.

METT-T will determine force ratios, but for river crossings in the offense, a greater than 3 to 1 ratio is normally required. However, under extremely favorable circumstances, it may be possible to cross a river and secure the entire objective area (the bridgehead) in a single sustained attack. This type of crossing and securing of the area in one phase may be feasible when the enemy is incapable of significantly delaying the advance of forces making the initial assault crossings or of disrupting subsequent operations.

An offensive deliberate river crossing has four phases. They are distinct in planning, but there is no pause between them in execution:

- Phase I. Advance to the river.

ŽPhase II. Assault across the river.

- Phase III. Advance from the exit bank.

ŽPhase IV. Secure the bridgehead line.

(See FM 90-13.)

Synchronization

Engineer Assets. Corps engineer assets, to include combat engineer battalions and assault bridge companies, will be placed OPCON or DS to the division under the C^2 of an engineer group headquarters. Additionally, assets may be received from in-place US or allied nations. In the latter case, extensive liaison will be required between attacking forces and those in-place.

Chemical Unit Smoke Operations. Chemical operations provide large-area, long-duration smoke to conceal emplacement of crossing means, such as bridges or rafts. They also support deception by drawing attention to a false crossing site.

Fire Support. Fire support must be integrated into the overall maneuver plan. Supporting fires available to river crossing operations may include field artillery, attack helicopters, CAS, and perhaps naval gunfire. The main missions for the FS systems in river crossing operations are to—

- Destroy and suppress enemy direct and indirect fire.
- Isolate the crossing sites and the bridgehead.

ŽProvide interdiction fires, particularly against movement of enemy reserves.

ŽProvide illumination and smoke.

- Suppress and destroy enemy air defenses and C^2 facilities.
- Deliver scatterable mines to protect the flanks, support the defense of the bridgehead, and restrict enemy activity in the vicinity of the obstacle.

Air Defense. River crossing operations are highly vulnerable to enemy air attack. Their vulnerability is caused by—

- Restriction on the movement of the attacking friendly forces.

ŽConcentration of forces in the buildup for the operation.

- Exposure of personnel and equipment to enemy observation while crossing the river.

ŽDifficulty and delay which may be involved in crossing the river.

ŽNatural avenues of low-altitude air attack that rivers afford.

These vulnerabilities and the importance of the river crossing to the overall operation require that lead divisions be given a high priority for allocation of corps air defense assets.

Movement Control. The aim of the movement control plan is to speed movement across the river and maintain the momentum of the operation. To accomplish this, a maintenance and refuel site should be established on the friendly side of the river. This will help maintain the momentum. The plan requires detailed coordination between movement control agencies and maneuver forces, to include in-place forces and corps where applicable.

Crossing sites are normally selected by the brigade commander. Division may specify crossing sites when a certain location is critical to the tactical concept. The factors of METT-T determine the number of crossing sites. Depending on

available resources, it is desirable that each assault battalion have at least one good assault crossing site in its zone. Control of the crossing sites generally reverts to the corps on movement of the lead division's essential CS and CSS assets across the obstacle.

Deception operations include feints, demonstrations, ruses, and displays. The objectives of the division deception effort are normally part of a corps deception. Deception considerations include:

Ž Concealing the location and strength of force buildup.

Ž Concealing the location of the proposed crossings and, within it, the main effort.

Ž Causing the enemy to reveal his defensive fires.

Ž Causing the enemy to shift his fires from the main effort.

Ž Causing the enemy to commit reserves improperly against the bridgehead or to delay commitment of reserves.

Deception measures must be plausible to the enemy. A feasible course of action discarded in the planning may provide a good basis for a deception plan.

Retrograde River Crossing Operations

A retrograde river crossing is a special operation that requires detailed planning and support. Normally, the extent of the water obstacle and the enemy situation will dictate just how the crossing will be accomplished.

A retrograde river crossing is usually conducted when enemy advances threaten to overwhelm the division. The commander responds to this situation by directing the execution of some form of retrograde operation. While executing a retrograde operation, the division may be subjected to possible enemy pursuit. In such a situation, the retrograde river crossing may be conducted to accomplish one of two objectives:

• To establish a new defense on the exit bank of the river.

• To continue the retrograde to new defensive positions designated beyond the obstacle.

Retrograde river crossings are not merely offensive river crossings conducted in reverse. Retrograde river crossings are characterized by the following:

• Detailed planning and centralized control.

• Enemy control of maneuver initiative.

• High risk to friendly forces.

Ž Use of delaying forces to impede the enemy's advance and to trade space for time at the crossing sites.

• Forces on the exit bank providing defensive and overmatching fires.

The retrograde river crossing should be conducted with the same amount of detailed planning that is associated with a deliberate offensive crossing. For planning purposes, the crossing operation is divided into three distinct actions: delay, defense, and crossing. Even though these actions are distinct, they take place concurrently on the battlefield.

The *delay's* primary purpose is to trade space for time. The time gained allows the main body of the corps to move across the river. The corps elements not engaged in the delay execute a planned retirement or withdrawal and cross the river as quickly as possible. These elements are assigned various missions within the crossing area or in the defense which is established on the exit bank. The movement of these elements toward and across the river should be consistent with the overall retrograde being conducted by the entire corps. This is required to preclude the enemy's early detection of the actual crossing sites.

The commander will direct that delay operations continue until delay forces reach the battle hand-over or holding line. At this time, the units which have repositioned and occupied assigned defensive positions on the exit bank assume responsibility for the battle. The delay force then disengages and begins its rearward crossing.

The establishment of a strong exit bank defense in each divisional sector is undertaken concurrently with the execution of delay operations. The defense of the exit bank must be as strong as possible with the available troops. The primary

mission of the defense is to overwatch the crossing of the forces remaining on the far side of the river.

Once defense forces are directed by the commander to assume responsibility for the battle, they are expected to defeat, or at least contain, the enemy in a specified area. This is essential for the successful completion of the crossing. As units engaged in delay operations negotiate the crossing, they are incorporated into the defense or are directed to prepare to assume the delay mission if further retrograde operations are warranted.

Because friendly forces control both banks of the river for some period prior to the operation, existing bridges and crossing sites should be continually improved and repaired. All available tactical bridging and rafting within the corps should be installed or prepositioned to the rear to supplement existing crossing means.

The activity begins with the actual crossings of CSS elements. These units evacuate all nonessential supplies and engage in prestocking the delay and defense forces. The crossing sites within the rear area should be fully operational early in the retrograde to allow elements not involved in the delay to cross the river at the earliest possible time consistent with the tactical situation.

Operations within the retrograde crossing area are characterized by—

- Rapid and controlled flow of traffic across the river.
- Maximum use of concealment and dispersal.

Ž Coordinated crossing of equipment and supplies.

Ž Coordination between the defense and delay forces for use of crossing sites by the latter.

The difficulty of command, control, and coordination of retrograde crossings requires a clearly understood delineation of missions and tasks between the delaying, defending, and support forces.

Since the enemy has the maneuver initiative, it is essential to employ deception operations as an integral part of the plan. Deception should be planned and executed to deceive the enemy regarding the retrograde. The deception story should seek to conceal the location and extent of crossing operations.